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SEQ ID NO:11 *Paramecium caudatum*

MSLFELGQAAVQAVTAQFYANIQADATVATFFNGIDMPNQTNKTA AFLCAALGGPNA  
WTGRNLKEVHANMGVSNAQFTTVIGHLRSALTGAGVAAALVEQTVAVAETVRGDVVTV

SEQ ID NO:12 *Aspergillus niger*

MPLTPEQIKI IKATVPVLQEYGTKITTA FYMNMSTVHPELNAVFNTANQVKGHQARALA  
GALFAYASHIDDLGALGPAVELICNKHASLYIQADEYKIVGKYLLEAMKEVLGDACTDD  
ILDAWGAA YWALADIMINREAALYKQSQG

SEQ ID NO:13 *Zea mays*

MALAEADDGAVVFGEEQEALVLKSWAVMKKDAANLGLRFFLKVF EIAPSAEQMF SFLRD  
SDVPLEKNPKLKTHAMSVFVMTCEAAAQLRKAGKVTVR ETTLKRLGATHLRYGVADGHF  
EVTGFALLETIKEALPADMWSLEMKKAWAEAYSQ LVAAIKREMKPDA

SEQ ID NO:14 *Oryza sativa subsp. japonica*

MALVEGNNGVSGGAVSFSEEQEALVLKSWAIMKKDSANIGLRFFLKIF EVAPSASQMFS  
FLRNSDVPLEKNPKLKTHAMSVFVMTCEAAAQLRKAGKVTVR DTTLKRLGATHFKYGVG  
DAHFEVTRFALLETIKEAVPVDMWSPAMKSAWSEAYNQLVAAIKQEMKP AE

SEQ ID NO:15 *Arabidopsis thaliana*

MESEGKIVFTEEQEALVVKSWSVMKKNSAELGLKLFIKIFEIAPT TTKMFSFLRDSPI P  
AEQNPKLKPHAMSVFVMCCESAVQLRKTGKVTVR ETTLKRLGASHSKYGVVDEHFEVAK  
YALLETIKEAVPEMWSPEMKVAWGQAYDHLVAAIKAEMNLSN

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SEQ ID NO:16 *Pisum sativum*

MGFTDKQEALVNSSWESFKQNLSGNSILFYTTIILEKAPAAKGLFSFLKDTAGVEDSPKL  
QAHAEQVFGLVRDSAAQLRTKGEVVLGNATLGAIHVQRGVTDPHFVVVKEALLQTIKKA  
SGNNWSEELNTAWEVAYDGLATAIKKAMT

SEQ ID NO:17 *Vigna unguiculata*

MVAFSDKQEALVNGAYEAFKANIPKYSVVFYTTILEKAPAAKNLFSFLANGVDATNPKL  
TGHAEKLFGLVRDSAAQLRASGGVVADAALGAVHSQKAVNDAQFVVVKEALVKTLKEAV  
GDKWSDELGTAVELAYDELAAAIKKAY

SEQ ID NO:18 *Bos taurus*

MGLSDGEWQLVLNAGWKVEADVAGHGQEVILIRLFTGHPETLEKFDKFKHLKTEAEMKAS  
EDLKKHGNTVLTALGGILKKKGHHEAEVKHLAESHANKHKIPVKYLEFISDAIIHVLHA  
KHPSDFGADAQAAMSKALELFRNDMAAQYKVLGFHG

SEQ ID NO:19 *Sus scrofa*

MGLSDGEWQLVLNVWGKVEADVAGHGQEVILIRLFKGHPETLEKFDKFKHLKSEDEMKA  
EDLKKHGNTVLTALGGILKKKGHHEAELTPLAQSHATKHKIPVKYLEFISEAIIQVLQS  
KH PGDFGADAQGAMSKALELFRNDMAAKYKELGFQG

SEQ ID NO: 20 *Equus caballus*

MGLSDGEWQQVLNVWGKVEADIAGHGQEVILIRLFTGHPETLEKFDKFKHLKTEAEMKAS  
EDLKKHGTVVLTALGGILKKKGHHEAELKPLAQSHATKHKIPVKYLEFISDAIIHVLHS  
KH PGDFGADAQGAMTKALELFRNDIAAKYKELGFQG

SEQ ID NO: 21 *Nicotiana benthamiana*

MSSFTEEQEALVVKSWDSMKKNAGEWGLKLFLKIFEIAPSAKKLFSFLKDSNVPL  
EQNAKLKPHSKSVFVMTCEAAVQLRKAGKVVRDSTLKKLGATHFKYGVAD  
HFEVTKFALLETIKEAVPEMWSVDMKNAWGEAFDQLVNAIKTEMK

SEQ ID NO: 22 *Bacillus subtilis*

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MGQSFNAPYEAI GEE LLSQLVDTFYERVASHPLLKPIFPSDLTETARKQKQFLTQY  
LGGPPLYTEEHGHPMLRARHLPPFITNERADAWLSCMKDAMDHVGLEGEIREFL  
FGRLELTARHVMVNQTEAEDRSS

SEQ ID NO: 23 *Corynebacterium glutamicum*

MTTSENFYDSVGGEETFS LIVHRFYEQVPND DILGPMYPPDDFEGAEQRLKMFLS  
QYWGGPKDYQEQRGHPRLRM RHVNYPIGVTA AERWLQLMSNALDGVDLTAEQ  
REAIWEH MVRAADMLINSNPDPHA

SEQ ID NO: 24 *Synechocystis* PCC6803

MSTLYEKLGGTTAVDLAVDKFYERVLQDDRIKHFFADVDMAKQRAHQKAFLTY  
AFGGTDKYDGRYMREAHKELVENHGLNGEHF DAVAEDLLATLKEMGVPEDLIA  
EVA AVAGAPAHKRDVLNQ

SEQ ID NO: 25 *Synechococcus* sp. PCC 7335

MDVALLEKSFEQISPR AIEFSASFYQNLFH HHP ELKPLFAETSQTIQEKKLIFSLAAI  
IENLRNP DILQPALKSLGARHAEVGTIKSHYPLVGQALIETFAEYLAADWTEQLA  
TAWVEAYDVIAST MIEGADNPAAYLEPELTFYEWLDLYGEESPKVRNAIATLTH  
FHYGEDPQDVQRDSRG

SEQ ID NO: 26 *Nostoc commune*

MSTLYDNIGGQPAIEQVVDELHKRIATDSLLAPVFAGTDMVKQRNHLVAFLAQIF  
EGPKQYGGRPMDKTHAGLNLQQPHFD AIAKHLGERMAVRGVSAENTKAALDR  
VTNMKGAILNK

SEQ ID NO: 27 *Bacillus megaterium*

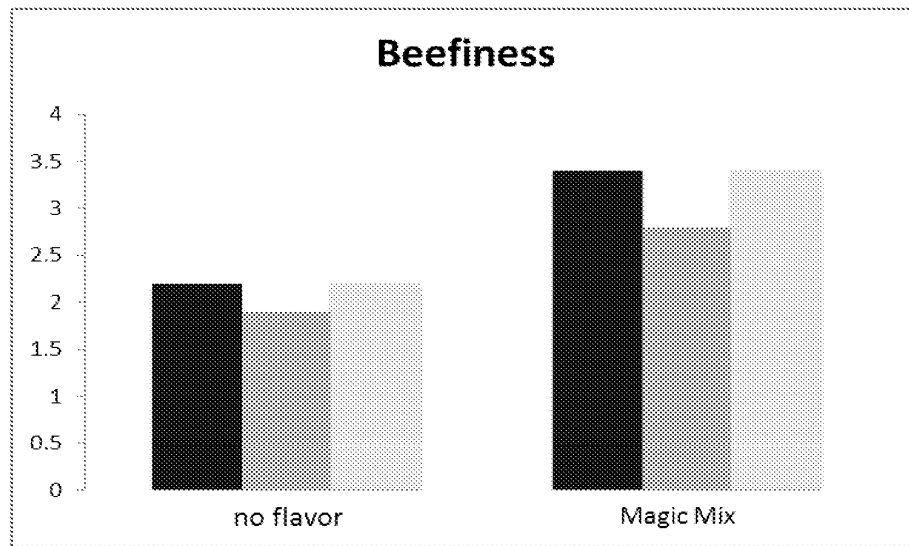
MREKIHSPYELLGGEHTISKLVDAFYTRVGQHPELAPIFPDNL TETARKQKQFLTQ  
YLGGPSLYTEEHGHPMLRARHL PFEITPSRAKAWLTCMHEAMDEINLEGPERDE  
LYHRLILTAQHMIN SPEQTDEKGF SH

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FIGURE 2



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(19) World Intellectual Property  
Organization  
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- (74) Agents: LAVOIE, Teresa et al.; Fish & Richardson P.C., P.O. Box 1022, Minneapolis, Minnesota 55440 (US).

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(88) Date of publication of the international search report:  
4 September 2014



WO 2014/110532 A3

(54) Title: METHODS AND COMPOSITIONS FOR AFFECTING THE FLAVOR AND AROMA PROFILE OF CONSUMABLES

(57) Abstract: This document relates to food products containing highly conjugated heterocyclic rings complexed to an iron ion and one or more flavor precursors, and using such food products to modulate the flavor and/or aroma profile of other foods. The food products described herein can be prepared in various ways and can be formulated to be free of animal products.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US14/11347

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|--|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC(8) - A23D 7/005, 9/013; A23L 1/30 (2014.01)<br>USPC - 426/92, 641, 647<br>According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC(8): A23D 7/00, 59/013, 9/00, 9/06, 7/02; A23L 1/30, 1/226, 1/226, 1/217, 1/235 (2014.01)<br>USPC: 426/613, 506, 535, 808, 537, 92, 540, 96, 644, 643, 641, 647, 250, 646<br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); Google/Google Scholar; PubMed; ProQuest; flavor, taste, precursor, iron, 'heterocycline ring,' heme, phenylacetaldehyde, food, consumable, beef, chicken, pork, lamb, turkey                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                               | Relevant to claim No.                                                                      |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| X<br>---<br>Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | US 2009/0274817 A1 (YAMAGUCHI, S et al.); November 05, 2009: paragraphs [0024], [0029], [0035], [0040], [0045], [0053], [0078]; Table 9                                                                                                          | 1-10, 35-37, 39<br>-----<br>28-34                                                          |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 3829582 A (GUADAGNI, DG et al.); August 13, 1974; abstract; column 1, lines 30-35; Claims 1-3                                                                                                                                                 | 28-34                                                                                      |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US 5443852 A (SHAHIDI, F et al.); August 22, 1995; column 8, lines 10-25; column 8, lines 50-60; column 42, lines 5-15                                                                                                                           | 29-33                                                                                      |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| <p>* Special categories of cited documents:</p> <table border="0"><tr><td>"A" document defining the general state of the art which is not considered to be of particular relevance</td><td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td></tr><tr><td>"E" earlier application or patent but published on or after the international filing date</td><td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td></tr><tr><td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td><td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td></tr><tr><td>"O" document referring to an oral disclosure, use, exhibition or other means</td><td>"&amp;" document member of the same patent family</td></tr><tr><td>"P" document published prior to the international filing date but later than the priority date claimed</td><td></td></tr></table> |                                                                                                                                                                                                                                                  |                                                                                            | "A" document defining the general state of the art which is not considered to be of particular relevance | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention | "E" earlier application or patent but published on or after the international filing date | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone | "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art | "O" document referring to an oral disclosure, use, exhibition or other means | "&" document member of the same patent family | "P" document published prior to the international filing date but later than the priority date claimed |  |
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                              |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| "E" earlier application or patent but published on or after the international filing date                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                                                                     |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| "O" document referring to an oral disclosure, use, exhibition or other means                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | "&" document member of the same patent family                                                                                                                                                                                                    |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                  |                                                                                            |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| Date of the actual completion of the international search<br>09 June 2014 (09.06.2014)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                  | Date of mailing of the international search report<br><b>03 JUL 2014</b>                   |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-3201                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                  | Authorized officer:<br>Shane Thomas<br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |                                                                                                          |                                                                                                                                                                                                     |                                                                                           |                                                                                                                                                                              |                                                                                                                                                                         |                                                                                                                                                                                                                                                  |                                                                              |                                               |                                                                                                        |  |

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/11347

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

\*\*\*-Please See Supplemental Page-\*\*\*

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Groups I+: Claims 1-10, 28-37, 39, phenylacetaldehyde (flavor compound, not the precursor molecule)

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/11347

\*\*\*Continued from Box III \*\*\*

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I+: Claims 1-10, 28-37, 39, and Tables 3, 8, 9, 12, 14, 16, and 17 (flavor compounds) are directed toward a food product comprising: a) a highly conjugated heterocyclic ring complexed to iron ion; and b) one or more flavor precursor molecules; and a method for producing a flavor compound, said method comprising: a) combining a highly conjugated heterocyclic ring complexed to iron ion with one or more flavor precursor molecules to form a mixture, and b) heating the mixture to form one or more flavor compounds; a food product comprising: a) a heme-containing protein; and b) one or more flavor precursor molecules; a method for producing a flavor compound, said method comprising: a) combining a heme-containing protein, cysteine, and a sugar, and one or more optional flavor precursor molecules to form a mixture, and b) heating the mixture to form one or more flavor compounds; and a method for imparting a meat-like flavor to a food product comprising contacting said food product with a flavoring composition, said flavoring composition comprising i) a heme-containing protein; and ii) one or more flavor precursor molecules, wherein after heating said food product and said flavoring composition together, a meat-like flavor is imparted to said food product.

Group II: Claim 40 is directed toward a method for producing a flavor compound, said method comprising: a) incubating a heme-moiety bound to a solid support with one or more flavor precursor molecules and b) heating the heme-moiety bound to said solid support and one or more flavor precursors to form one or more flavor compounds.

The food product, the methods for producing a flavor compound, and the method for imparting a meat-like flavor to a food product will be searched to the extent that they encompass the first item in Table 3, phenylacetaldehyde (flavor compound). It is believed that Claims 1-10, 28-37 and 39 encompass this first named invention and thus these claims will be searched without fee to the extent that they encompass the first item in Table 3, phenylacetaldehyde (flavor compound). Applicants must indicate, if applicable, the claims which encompass this first named invention if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" groups will result in only the first claimed invention to be searched/examined. An Exemplary Election would be: the second item in Table 3, 1-octen-3-one (flavor compound).

The inventions listed as Groups I+-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical features of Group I+ include a method for imparting a meat-like flavor to a food product comprising contacting said food product with a flavoring composition, wherein after heating said food product and said flavoring composition together, a meat-like flavor is imparted to said food product, which are not present in Group II, the special technical features of Group II including a heme-moiety bound to a solid support.

Groups I+-II share the technical features including a method for producing a flavor compound, said method comprising: a) combining a heme-moiety with one or more flavor precursor molecules selected from a group including a sugar and cysteine; and b) heating the heme-moiety and one or more flavor precursors to form one or more flavor compounds selected from a group including phenylacetaldehyde. Groups I+ share the technical features including a food product comprising: a) a highly conjugated heterocyclic ring complexed to iron ion; and b) one or more flavor precursor molecules; and a method for producing a flavor compound, said method comprising: a) combining a highly conjugated heterocyclic ring complexed to iron ion with one or more flavor precursor molecules to form a mixture, and b) heating the mixture to form one or more flavor compounds; a food product comprising: a) a heme-containing protein; and b) one or more flavor precursor molecules; a method for producing a flavor compound, said method comprising: a) combining a heme-containing protein, cysteine, and a sugar, and one or more optional flavor precursor molecules to form a mixture, and b) heating the mixture to form one or more flavor compounds; and a method for imparting a meat-like flavor to a food product comprising contacting said food product with a flavoring composition, said flavoring composition comprising i) a heme-containing protein; and ii) one or more flavor precursor molecules, wherein after heating said food product and said flavoring composition together, a meat-like flavor is imparted to said food product.

\*\*\*Continued Within the Next Supplemental Box\*\*\*

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US14/11347

-\*\*\*-Continued from Previous Supplemental Box-\*\*\*-

However, these shared technical features are previously disclosed by US 2009/0274817 A1 to Yamaguchi, et al. (hereinafter 'Yamaguchi') in view of the publication entitled 'The Chemistry Of Beef Flavor: Executive Summary' by Brewer, and the publication entitled 'Prediction Of Beef Flavor By Precursor And Volatile Compounds' by Brooks, et al. (hereinafter 'Brooks'). Yamaguchi discloses a method for producing a flavor compound (creating a body taste-improver; paragraphs [0023]-[0027]), said method comprising: a) combining a heme-moiety with one or more flavor precursor molecules (the body-taste improver combines heme iron with another component (flavor precursor molecule); paragraphs [0024]-[0027], [0029]); and b) heating the heme-moiety and one or more flavor precursors (heating the body taste improver, comprising heme iron with another flavor component, enhances the taste enhancing effect; paragraphs [0041], [0043], [0053]); a food product (a food with an improved body taste; paragraph [0053]) comprising: a) a highly conjugated heterocyclic ring complexed to iron ion (a body taste-increasing component consists of heme iron; paragraphs [0027], [0029]); and b) one or more flavor precursor molecules (the body-taste improver combines heme iron with another component (flavor precursor molecule); paragraphs [0024]-[0027], [0029]); and a method for producing a flavor compound (a method of creating a body taste-improver; paragraphs [0023]-[0027]), said method comprising: a) combining a highly conjugated heterocyclic ring complexed to iron ion with one or more flavor precursor molecules (the body-taste improver combines heme iron with another component (flavor precursor molecule); paragraphs [0024]-[0027], [0029]) to form a mixture (a composition comprising various body taste improving components (a mixture); paragraph [0024]), and b) heating the mixture (heating the body taste improver, comprising heme iron with another flavor component, enhances the taste enhancing effect; paragraphs [0041], [0043], [0053]). Yamaguchi does not disclose flavor precursor molecules selected from a group including a sugar and cysteine; forming one or more flavor compounds selected from the group including phenylacetaldehyde; a food product comprising: a) a heme-containing protein; and b) one or more flavor precursor molecules selected from a group including a sugar and cysteine; a method comprising: a) combining a heme-containing protein, cysteine, and a sugar; or a method for imparting a meat-like flavor to a food product comprising contacting said food product with a flavoring composition, said flavoring composition comprising i) a heme-containing protein; and ii) one or more flavor precursor molecules selected from a group including a sugar, wherein after heating said food product and said flavoring composition together, a meat-like flavor is imparted to said food product. Brewer discloses flavor precursor molecules selected from a group including a sugar (precursor compounds include sugars such as glucose, fructose or ribose; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1) and cysteine (precursor compounds include amino acids such as cysteine; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1); a food product (beef (food product); page 2, left column, first paragraph to right column, first paragraph) comprising: a) a heme-containing protein (beef contains heme protein which can contribute to its flavor; page 10, left column, second paragraph; page 11, right column, first paragraph); and b) one or more flavor precursor molecules selected from a group including a sugar (precursor compounds include sugars, such as glucose, fructose or ribose; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1) and cysteine (precursor compounds include amino acids such as cysteine; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1); a method comprising: a) combining a heme-containing protein (beef contains heme protein which can contribute to its flavor; page 10, left column, second paragraph; page 11, right column, first paragraph), cysteine (precursor compounds include amino acids, such as cysteine; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1), and a sugar (precursor compounds include sugars, such as glucose, fructose or ribose; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1), and one or more optional flavor precursor molecules to form a mixture (optional language not analyzed); and a method for imparting a meat-like flavor to a food product (developing a beef flavor in beef (food product); page 2, left column, first paragraph to right column, first paragraph) comprising contacting said food product with a flavoring composition (precursor compounds including flavor-active volatiles embedded in a matrix (composition); page 2, left column, first paragraph), said flavoring composition comprising i) a heme-containing protein (beef contains heme protein which can contribute to its flavor; page 10, left column, second paragraph; page 11, right column, first paragraph); and ii) one or more flavor precursor molecules selected from a group including a sugar (precursor compounds include sugars such as glucose, fructose or ribose; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1) and cysteine (precursor compounds include amino acids such as cysteine; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1), wherein after heating said food product and said flavoring composition together, a meat-like flavor is imparted to said food product (beef flavor is developed by heating the beef; page 2, left column, first paragraph to right column, first paragraph). Brooks discloses a flavor compound selected from the group including phenylacetaldehyde (phenylacetaldehyde is a volatile flavor compound present in cooked steak; page 4, Table 8). It would have been obvious to a person of ordinary skill in the art, at the time of the invention, to have modified the methods for producing a flavor compound and the food product, as previously disclosed by Yamaguchi, for including the use of the flavor precursor molecules and the method for imparting a meat-like flavor to a food product, as previously disclosed by Brewer, as the previous disclosure by Yamaguchi includes the use of compounds which when heated oxidize and enhance the flavor of foods, including meats (Yamaguchi; paragraphs [0022], [0041], [0043], [0053]). Brewer discloses flavor precursor molecules which, when heated, impart various flavors to beef (Brewer; page 2, left column, first paragraph to right column, first paragraph; page 2, Table 1), and a combination of these references would have resulted in an improved flavor enhancer for imparting meat flavors to foods when cooked. Additionally, it would have been obvious to a person of ordinary skill in the art, at the time of the invention, to have modified the methods for producing a flavor compound and the food product, as previously disclosed by Yamaguchi, for including forming flavor compounds, such as phenylacetaldehyde, as previously disclosed by Brooks, as the previous disclosure by Yamaguchi includes the use of volatile compounds which, when heated, oxidize and enhance the flavor of foods, including meats (Yamaguchi; paragraphs [0022], [0041], [0043], [0044], [0053]). Brooks discloses volatile flavor compounds present in cooked steaks, including phenylacetaldehyde, which is present in higher concentrations in Prime quality grade steaks (Brooks; page 4, Table 8), and a combination of these references would have resulted in an improved method for imparting meat flavors to food, based on the formation of desirable volatile compounds, when the food is cooked.

Since none of the special technical features of the Groups I-II+ inventions is found in more than one of the inventions, and since all of the shared technical features are previously disclosed by Yamaguchi, Brewer and Brooks references, unity of invention is lacking.

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## 特 許 公 報

特許出願公告

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(金3頁)

## フレーバ(香味)添加剤の製造法

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## 発明の詳細な説明

本発明は肉類似の味を有し、且つ食品のフレーバ(香味)を増進するために用いることの出来るフレーバ添加物(flavouring preparation)の製造に関するものである。アミノ酸又は蛋白質を含有する物質が単糖類或いは多糖類の存在下で加熱されるときはメイラード(maillard)反応が起ることが知られている。この反応の特徴はアロマ(aroma)の生成及び反応剤の縮変を伴うことにある。反応の結果アロマが生ずるためカラメル或いはパン皮類似の味を有するフレーバ添加剤を製造するのに比してこの反応を利用することができるのである。

一般に肉エキスを製造中の特徴的なロースト様(roasted)フレーバの生成は少くとも1部は此の反応に依ると考えられている。然しながら、反応は極めて複雑であつて、その機構はまだ充分には理解されていない。従つて選択した既知の原料をもつて反応を行つた場合でも、その結果を規定することはできない。

最近の研究の結果、ロースト肉の特徴的フレーバの生成には糖質の存在が必須であることが判明した。更に、肉はかなりの量のグルタチオンを

有していること、そしてこの物質がロースト肉の特徴的味の発生に寄与しているらしいということが知られている。他方、生筋肉の液汁には認め得る程度の遊離アミノ酸及びペントーズやヘキソースの糖酸エステルが含有されていることが見出された。従つて、肉のアロマは少くとも1部はアミノ酸及び糖とグルタチオンとの反応によつて生成するものと考えられる。

メイラード反応を含む方法がロースト肉類似のアロマを有するフレーバ添加剤を調整するために記載されている。ロースト肉類似の味を有する製品が、例えばシスチン或いはシステインと、キシロースの如き単糖類及びその他の1種又は1種以上のアミノ酸を原料として製造できることが記載されている。各成分の反応は既知の方法に従い、水の存在下で下記に要約する所の特定条件下で行なわれる。

水の使用量は単糖類の量の5-1500倍であり、反応は還流下で行なわれる。シスチン或いはシステイン対単糖類の比は0.4:1乃至2:1である。

然しながら、此の方法によつて得られた製品は比較的弱く、且つ幾分不安定である。更に、これらの方法は非常に稀い溶液の真空蒸発或いは混合物の凍結乾燥を含んでおり、揮発性アロマのかなりの損失が起る。其の上、大量の水の存在はかなりの装置を必要とする。従つて、斯る方法は寧ろコスト高となる傾向がある。

本発明の目的は強いアロマを有し、且つ、又非常に安定なフレーバ添加剤を製造する簡単、且つ経済的方法を供与することにある。

即ち、本発明によれば、システイン及び(又は)グルタチオンと、単糖類の1つと及びその他の少なくとも1種のアミノ酸とを反応させることにより、而してシステイン及び(又は)グルタチオンと単糖類との重量比が0.05:1乃至0.4:1であり、反応を高温で水溶液又は水性懸濁液で行なうことを特徴とする肉エキスの風味を有するフレーバ添加剤の製造方法が提供される。反応混合物は重量で30%以下の水を含有するのが好ましく、アミノ酸とシステイン及び(又は)グルタチオンとの重量比が50:1乃至500:

(2)

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1にあるのが好都合である。望むならばグルタチオン及び／或いはシステインは天然の蛋白性物質の加水分解、特に酵母、血液或いは肝臓の酵素的加水分解物の形として用いることも出来る。

アミノ酸源として特に適当なものは、動物或いは植物蛋白の酸、アルカリ又は酵素的加水分解物例えば肉、血液、或いは小麦グルテンの加水分解物である。或いは、それらの代りに純アミノ酸の人工混合物を用いることも出来る。

此の様な加水分解物は、好ましくは使用前に脱色及び脱臭（例えば活性炭と共に高温で加熱することによつて）しなければならない。此の処理後得られた稀い加水分解物は、例えば固形物80—90%を含有するペーストまで濃縮するのがよい。

塩酸の作用によつて得られた加水分解物は若干量の食塩を含んでいる、がしかしこのものは反応には影響しない。アミノ酸源として用いられる加水分解物は取扱いを容易にするために粘稠なペーストの形となして約70℃に加熱される。

本発明に従う方法は、例えば下記の如くして実施される。

ベントーズ（例えばキシロース或いはリボース）及び／或いはヘキソースと—OH基を含有する天然物（システイン、グルタチオン）或いは酵母、血液又は肝臓の酵素的加水分解物の混合物を蛋白加水分解物（アミノ酸80—70%を含有し、上記の如くして、脱色脱臭した）によつて供給されるアミノ酸或いはアミノ酸類に加える。含窒化合物を供給する加水分解物は濃縮して、少くとも約80%の固形物を有するペーストとするのが好ましく、且つ0.1—2.0%のグルタチオン及び／或いはシステインを含有しなければならない。或いは又、加水分解物を貯蔵する必要がある場合には濃縮後乾燥することが出来る。そして使用時に適量の水と混ぜ合わせて所望する固形物濃度とすることが出来る。望むならばリボース及び含窒化合物は酵母加水分解物によつて供給出来る。

反応自体は、好ましくは攪拌をしつつ、温度80—110℃、好ましくは90℃で行なわれる。加熱の影響下で、塊は先づ第一に泡立つ、そしてついで褐色に変る。反応剤及び最終製品の所望する味によつて反応時間は10分間から6時間まで変り得る。反応が完結したら、混合物を苛性ソーダで中和する。

仕上げペーストは直接貯蔵容器中に滴すことが

出来る。ペーストはそこで固化する。好ましくは製品は充分に充てんした密閉容器中に10—15℃以下の温度で貯蔵しなければならない。此の方法で、製品は長期の保存後でも変質しないのである。

本発明の好ましい具体例に従つて、反応混合物中に乳酸塩（例えば乳酸カルシウム又はカリウム）を混入することによつて製品のフレーバを更に増進することが出来る。此の添加は、好ましくは反応の前又は終で行なわれる。例えばアミノ酸を含有する加水分解物に、この加水分解物を濃縮する前に相当する塩基及び乳酸を添加することによつて行なわれる。最終製品中の乳酸塩濃度は約25%まで、好ましくは10—15重量%範囲とすることが出来る。

又イノシン酸、又は5'-グアニル酸、或いはこれらの酸の塩を添加することによつて更に製品の品質を改良することも出来る。

本発明法に従つて製造されるフレーバ添加剤は水に溶かし、此の形態で食品用の調味料として用いることが出来る。

下記の実施例は本発明の実施法を説明するものであるが、しかし本発明はその記載条件に規定されるものではない。尚、パーセントは重量パーセントを示す。

#### 実施例 1

小麦グルテン90kgを塩酸と共に還流下或いは加圧下で加熱することによつて加水分解する。水解物は苛性ソーダ又は炭酸塩でpH5—6.5まで中和する。不溶物を濾過を行つて除き、濾液は食塩の沈殿が現われるまで蒸発する。数週間放置した後、溶液を再び濾過し、90%乳酸7kgと活性炭（カルボラフィンC或いはノーリット）3kgを加える。混合物を75℃に加熱し、2時間攪き混ぜる。次に苛性カリ4kgを水に溶かして加え、溶液を濾過して活性炭を除き、濾液のpHを5—6.5の間の値に調節する。

黄色溶液を蒸発して85—88%固形物を含有するペーストとする。斯して得られたペースト115kgにキシロース1500gとシステイン800gを混ぜ合わせて、ステンレススチール釜に入れ、95℃で30—60分間加熱する。これによつて、肉エキスの非常に香のよいペーストが得られる。

加熱停止時に30%苛性ソーダ5.0%及びグアニル酸ソーダ、或いはイノシン酸ソーダ120

(3)

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g、或いは両者の混合物を加え、肉エキスイ代用品として用いることが出来る製品を得ることも出来る。ペーストを水に溶かせば、顕著な肉様味を有する非常に良好な食品調味料が得られる。

#### 実施例 2

新鮮肉或いは抽出肉（例えば肉エキスイ製造のスクラップ）を塩酸で加水分解し、実施例1記載の如く処理する。屠殺場の肉スクラップも同様に用いることが出来る。他方、魚ミールはトリエチルアミンを完全に除去した場合にのみ適当である。

動物蛋白水解物は、つづいて実施例1記載の如くして反応させて呈味剤を得る。製品の味を強めるためにシステイン-キシロース混合物の量を水解物の約5%まで増すことが出来る。然しながらシステイン/キシロース比は約0.2:1に保たなければならない。

#### 実施例 3

2.5kgの市販の乾燥酵母（トルラユネリス）を温水20ℓ中に懸濁する。温度を95℃に10分間保ち、ついで80℃に冷す。

ババイン1:350、10gを添加し、pHを7.0に調節する。6時間反応後、混合物を95℃で10分間加熱し、そしてpHを6.0に調節する。次に懸濁液を濾過し、残渣を温水で洗う。含した濾液を減圧下で蒸発すれば83%の固形物及び約0.7%のグルタチオン及び/或はシステインを含有する黄色ペースト1.8kgが得られる。

新鮮肉（筋肉、胃、肝臓、腎臓）を細く砕き、濃塩酸1.25kgを用い135℃で4時間加水分解する。次に水解物を炭酸ソーダ700gで中和し、そして濾過する。乳酸160g及び活性炭60gを加え、混合物を70℃で90分間加熱する。次に30%苛性カリ300gを加え、生成物を濾過する。黄色の濾液が得られる。此れを減圧下で蒸発すれば86%固形物及びアミノ酸約60%を含有する黄色のペースト2kgが得られる。

上記の如くして製造した酵母水解物1.8kgと肉水解物2.0kgを蔗糖450g及びキシロース90gと良く混ぜ合わせる。得られたペーストを攪き混ぜながら90℃で約1時間加熱する。生成物を70℃に冷却し、30%苛性ソーダ120mlを加える。最後にイノシン酸ソーダ45gをペーストと充分に混ぜ合わせる。肉エキスイと非常に似た香のよい製品4.3kgが得られる。

本発明は特許請求の範囲記載のフレーバ添加剤の製造法に關するものであるが、更に下記の態様をも包含するものである。

(1) システイン及び（又は）グルタチオンの給源として天然の蛋白質の加水分解物、好ましくは酵母、肝臓又は血液の酵素的加水分解物を使用する特許請求の範囲に記載の方法。

(2) 反応溶液或いは懸濁液が30%重量以下の水を含むしている特許請求の範囲及び前記(1)項のいずれかに記載の方法。

(3) アミノ酸に対するシステイン及び（又は）グルタチオンの重量比が50:1乃至500:1である特許請求の範囲及び前記(1)〜(2)項のいずれかに記載の方法。

(4) アミノ酸の給源として濃縮、脱色及び脱臭した動物又は植物性蛋白質の加水分解、好ましくは血液、肉又は小麦グルテンの酸加水分解物を使用する特許請求の範囲及び前記(1)〜(3)項のいずれかに記載の方法。

(5) 単糖類が少なくとも1種のペントース又はヘキソースである特許請求の範囲及び前記(1)〜(4)項のいずれかに記載の方法。

(6) ペントースがリボース又はキシロースである前記(5)項に記載の方法。

(7) 反応を乳酸塩の存在下に実施する特許請求の範囲及び前記(1)〜(6)項のいずれかに記載の方法。

(8) 乳酸とカルシウム又はカリウムの塩基とをアミノ酸又はアミノ酸給源に添加し、乳酸塩の全量が反応混合物の重量の約25%以下である前記(7)項に記載の方法。

(9) イノシン酸、5'-グアニル酸又はこれらの酸の塩の1つ或いはこれらの混合物をフレーバ添加剤に加える特許請求の範囲及び前記(1)〜(8)項のいずれかに記載の方法。

#### 特許請求の範囲

1 システイン及び（又は）グルタチオンと、単糖類の1つと及びその他の少なくとも1種のアミノ酸とを反応させることによりなり且つシステイン及び（又は）グルタチオンの単糖類に対する重量比が0.05:1乃至0.4:1であり、上記反応を高温で水溶液或いは懸濁液中で行なうことを特徴とする肉エキスイ類似の風味を有するフレーバ添加剤の製造法。

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⑥ 牛肉のフレーバーのする物質の製造方法

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#### 発明の詳細な説明

本発明は新規且つ有用な調味料組成物に係り、  
更に詳しくは糖類とアミノ酸、植物蛋白加水分解  
物及び 5-リボヌクレオチドの反応生成物からな  
り食品に牛肉様フレーバーを与えるのに有用な混  
合物に関するものである。

スープ、グレービーの如き多くの市販食品中の  
牛肉様フレーバーは該食品中に牛肉抽出物と称せ  
られる物を添加することにより得られている。牛  
肉抽出物は時間のかゝる高価な方法で作られるが  
該方法は一般に屠殺牛の肉組織を酸で加水分解す  
ることからなるものである。工業的に一般に用い  
られている方法では肉を加水分解し、次で混合物  
を中和し、液状部が大部分蒸発してしまう濃縮  
し褐色の実質的完全に加水分解された残留物、所  
謂牛肉抽出物を得る。この方法は比較的大きな装  
置を必要とし大量の牛肉組織を最終物たる比較的  
少量の濃縮抽出物にする為多くの熱を必要とする  
為高価である。

牛肉抽出物は、肉が比較的安く又加工費も少い

地域から米国に輸入されている商品である。多く  
の輸入商品と同様に、牛肉抽出物の価格は年間の  
季節により又食卓用の肉の要求量によつても変動  
する傾向がある。

又、抽出物の質は、業者がその製造に当り質の  
悪い切り肉を主として使用する為変動する傾向が  
ある。特に良質の肉の価が高い場合にはこういつ  
た結果になる。こういつた諸問題がある為食品加  
工業者は牛肉抽出物にたよらない方法を求めてい  
たのである。本発明の調味料組成物を使用すること  
によつて牛肉のフレーバーを付した食品製造に  
牛肉抽出物にたよらなくても良いことになった。  
即ち牛肉抽出物の代りに価格の安定している又将  
来は徐々に安価になつて行くことの期待される市  
場です入手可能な化学的並びに植物性物質から作ら  
れた組成物を使用することにより上記目的は達成  
せられる。この新規組成物の特に重要な利点は牛  
肉抽出物と価格を比較すれば容易に理解される、  
即ち食品製造に牛肉抽出物を使う場合は本発明の  
調味料組成物を用いる場合に比し約 3 倍も高価に  
なる。

従つて本発明の主要な目的の一つは食品中の牛  
肉抽出物の全量又は一部をそれで以て置換するこ  
との出来る牛肉のフレーバーのする組成物を提供  
するにある。

本発明の別の目的は肉を使用せずに牛肉のフレ  
ーバーのする食品を実質的安価に得る為の組成物  
を提供するにある。

本発明の更に別の目的は均質で、年中容易に入  
手出来、安価な調味料組成物を提供するにある。

本発明の上記並びに他の諸目的は本発明の組成  
物を使用することにより容易に達成せられる。

本発明に係る組成物は：

(a) ヘキソース及びペントース単糖類からなる群  
から選ばれる化合物を水の存在下にシステイン  
及びシステチンと加熱することにより作られる牛  
肉のフレーバーのする物質

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(b) 前記牛肉のフレーバーのする物質がシステインを用いて作られた場合には該物質1重量部当り約3〜約15重量部、又システインを用いて作られた場合には該物質1重量部当り約3乃至5重量部以下の植物蛋白加水分解物

(c) 前記牛肉のフレーバーのする物質1部当り約0.02〜約1.5重量部に当る、イノシン酸、グアニル酸、それらの生理学的に許容しうる塩、それらの混合物からなる群から選ばれるγーリボスクレオチドから成るものである。

特に良好なバランスの良くとれた牛肉フレーバーを与える本発明の一具体例に於ては上述の組成物に、前記牛肉のフレーバーのする物質1部当り約2〜約15重量部の、グルタミン酸及びその生理学的に許容しうる塩からなる群から選ばれる化合物を含ませる。

又、本発明の別の具体例では前記ヘキソーズがデキストロースであり前記ペントーズがアラビノーズである。この組成物はフレーバー及び経済性のバランスが非常によくとれている。

更に又別の具体例では牛肉のフレーバーのする物質1重量部当り約0.05〜0.5重量部のアラニン又はグリシンを含む前記の如きフレーバーの弱い組成物が提供せられる。

又、特に弱いフレーバーで高濃度で用いてもにがみのない組成物として前記牛肉のフレーバーのする物質1重量部当り約1〜4重量部のシュクロースの含有される上述の如き組成物が提供せられる。

味のバネル試験であらゆる点で牛肉抽出物と全く同等であることが見出された本発明の具体例では

(a) デキストロース及びアラビノーズを水の存在でシステイン又はシスチンと共に加熱して作られる牛肉のフレーバーのする物質

(b) シスチンを用いた場合は前記牛肉のフレーバーのする物質

1重量部当り約3〜約15重量部、システインが用いられた場合には牛肉のフレーバーのする物質1重量部当り約3〜約5重量部に当る植物蛋白加水分解物

(c) 前記牛肉のフレーバーのする物質1重量部当り約2〜約15重量部のモノソジウム グルタ

ノート

(d) 前記牛肉のフレーバーのする物質1重量部当り約1〜約4重量部のシュクロース

(e) 前記牛肉のフレーバーのする物質1重量部当り各々約0.05乃至約0.5重量部のアラニン及びグリシン、及び

(f) グアニル酸1重量部に対し約1重量部のイノシン酸からなる混合物を前記牛肉のフレーバーのする物質1重量部当り約0.02〜約1.5重量部存在せしめる。

なる組成を有する。

上記の組成物の各成分は商品として容易に入手できるか、または合成で得ることができる。

前記の(a)における「牛肉のフレーバーのする物質」はMorton 他の特許第2934437号およびその中の例に示されている。

牛肉のフレーバーのする物質を作るのに用いられる単糖類はペントーズ、又はヘキソーズ又はそれらの混合物である。ペントーズの代表的なものはリボース、アラビノース、キシロース等であり、ヘキソーズの代表的なものはグルコース、デキストロース、フルクトース等である。本願明細書に於て使用せる「植物蛋白加水分解物」なる語は穀類、特に小麦中に存在する植物蛋白の混合物、グルテンとして知られているものの如き植物性蛋白を酸、酵素又は他の方法で加水分解して得られる蛋白の人工的消化物を意味する。自由に入手しうるこの蛋白加水分解物は原料蛋白の構成成分を代表する各種アミノ酸からなっている。本願明細書に於て使用せる「生理学的に許容しうる塩」なる語はγーリボスクレオチド類、その中でイノシンーγーフォスフォリクアシッド即ちイノシン酸と呼ばれているものは特に重要、及びグルタミン酸の非毒性アルカリ金属類、アルカリ土類金属塩又は有機塩基塩を意味する。入手の容易なこと及び毒性の少いことでナトリウム塩及びカルシウム塩は特に有用である。

又、その他で重要なものはカリウム塩、アンモニウム塩、グリシンとの塩及び他の非毒性有機塩基との塩である。

イノシン酸と共に或はその代りに他のγーリボスクレオチドも本発明の実施に用いうることは見出された。この点に關し、通常使用されるイノシン酸源即ちイーストリボスクレイツクアシッドから

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誘導される或種の $\beta$ -リボスクレオチド即ちサイチジン- $\beta$ -フオスホリクアシド、ユリジン- $\beta$ -フオスホリクアシド及びグアノシン- $\beta$ -フオスホリクアシド(このものは通常グアニル酸と呼ばれている)について特に言及されている。

牛肉抽出物の代用として適している組成物に対しては牛肉のフレーバーのする物質、植物蛋白加水分解物及び $\beta$ -リボスクレオチドの三成分の全てが存在する必要がある。例えばスープベースに牛肉抽出物の代りに新規組成物を用いて味のベネルテストを行つた結果完全に満足すべき結果を得たが植物蛋白加水分解物の入らぬものや $\beta$ -スクレオチドの入らぬものを用いた場合に味が

あり全然代用し得ないことが判つた。本発明の実施に対しては植物蛋白加水分解物対牛肉のフレーバーのする物質の比を本願明細書に記載し且つ特許請求の範囲の項に記載してある値に保つことが重要である。もし牛肉のフレーバーのする物質1重量部当り約1.5重量部以上の加水分解物を使用すると、牛肉の味はもはや大してしなくなる。他方、もし、牛肉のフレーバーのする物質1重量部当り約3重量部以下の加水分解物を用いると明らかに味が認められるようになる。

又、本発明の実施には、牛肉のフレーバーのする物質に対する $\beta$ -リボスクレオチドの比を本願明細書記載の値に保つことが極めて望ましい。もし牛肉のフレーバーのする物質1重量部当り、1.5重量部以上のスクレオチドが存在すると本願発明の経済的利点が失われるし又、その量が0.2重量部以下だと牛肉のフレーバーが少くなる傾向が認められる。バランスのよくとれた適度のフレーバーと経済性という観点から特に有用な各成分の重量比は牛肉のフレーバーのする物質：植物蛋白加水分解物： $\beta$ -リボスクレオチド=1：5：0.30であることが判つた。

後段に於て例示されている如く、本発明に係る組成物は実質的に乾燥せる固体、ペースト、又は溶液の形で得られ且つ使用せられる。本発明に係る調味料組成物を牛肉抽出物の代りに用いる場合には最も望ましいフレーバー又はエッセンスにするためには最終製品の各々の好み及び性質に応じて使用濃度を幾分調節する必要がある。

こういった調節は当業技術者により容易になし

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うところであるし、又本発明の合成混合物のフレーバーの強さを牛肉抽出物の強さと同じにすることにより需要家が調節する必要性を大巾に少くすることが出来る。かかる組成物は適当な濃度を選択することにより容易に得られ、又後段に実施例として具体的に示されている。

ローストミートのフレーバーとにおいをもつた牛肉のフレーバーのするグレービーを作るのに特に適した本発明の一具体例に於ては、上述せる如き組成物に、前記牛肉のフレーバーのする物質1重量部当り約0.5～約1.5部の食用脂肪を添加する。

最も強いローストミートフレーバーを得る為には、具体例に示されている如く、牛肉のフレーバーのする物質と他の有効成分とを約70℃～約100℃に10分～約4時間加熱することが望ましい。当業技術者には明らかな如く、温度を高くすればする程、適当なフレーバーを得る為に必要な加熱時間は短くなる。優れた牛肉のフレーバーのする食品は又、本発明に係る牛肉抽出物代用物と最終食品とを加熱することにより得られる。

食用脂肪に関しては、動物性及び植物性脂肪何れをも用いる。例えば豚の脂肪、牛肉の脂肪、マーガリン、バター、ベニバナ油、等を用いることが出来る。ローストミートのにおい及び味になる反応は明瞭には理解されていないが、脂肪と共に混合物をこういった条件下に加熱すると、脂肪がない場合に比し極めて望ましい生成物が得られる。

食用脂肪の量は変更可能である。例えば牛肉のフレーバーのする物質に基いてその1重量部当り約0.5～約1.5重量部使用することが出来る。特に望ましい結果が得られるのは牛肉のフレーバーのする物質1重量部当り食用脂肪が8重量部の場合である。

各成分を混合する為の便利な方法は下記の如くである。

(a) ヘキソース及びペントース単糖類からなる群から選ばれた化合物とシスチン及びシステインからなる群から選ばれたアミノ酸との混合物を水の存在で牛肉のフレーバーのする混合物を得られる迄加熱する。

(b) 前記牛肉のフレーバーのする混合物1重量部当り、シスチンを用いた場合には約3～約1.5

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重量部の植物蛋白加水分解物を、又、システインを用いた場合には約3乃至5重量部以下の植物蛋白加水分解物を加え更に約0.02〜約1.5重量部のβ-リボスクレオチドを加え少くとも70℃に約2時間加熱する。

牛肉のフレーバーのする物質はシステインと約4〜4.5重量部の単糖類と約5重量部の水を混合し、90〜100℃に2時間加熱し、55℃に冷却し、50%の苛性ソーダ水溶液でPHを約6.9に調節することにより作るのが便利である。これを次にその約5重量の水で処理し、植物蛋白加水分解物とβ-リボスクレオチドを加え次に混合物を70℃に約2時間加熱し、冷却、ホモダナイズして需要家に特に便利に使用せられる形の重い蜂蜜様ペーストにする。以下実施例により本発明の詳細を説明するが、これらは本発明を何ら限定する意図のものではなく各種の変更が可能である。

## 実施例 1

デキストロース 12.5g、アラビノース 9.75g及びシステイン塩酸塩6.5gの混合物に水25mlを加え、混合物を100℃に2時間加熱し、55℃に冷却し、50%苛性ソーダ水溶液を加えてPHを3.2から6.9にせし、水35ml、植物蛋白加水分解物27.5g及びイノシン酸とグアニル酸の1:1重量比混合物1.8gを加え、次に70℃に2時間加熱し、冷却し、滑らかな蜂蜜様のものが得られる迄攪拌することにより牛肉のフレーバーのする組成物を作った。

上記方法に於て、イノシン酸とグアニル酸の混合物の代りに、各々ジナトリウム イノシネート、ジカリウム イノシネート、カルシウム イノシネート、

※ネート、ジアンモニウム イノシネート及びジナトリウム イノシネートとジナトリウム グアニレートの1:1重量比混合物を用いて牛肉のフレーバーのする組成物を作った。又、上記方法で5 モノナトリウム グルタメートの代りにグルタミン酸、モノカリウム グルタメート、モノカルシウム ジグルタミン酸及びモノアンモニウム グルタメートを用いて各々牛肉のフレーバーのする組成物を作った。

## 実施例 2

デキストロース 12.05g、アラビノース 9.75g、モノナトリウム グルタメート9.75g、システイン6.5g、アラニン4.65g及びグリシン3.3gを水300mlに溶解した。混合物を激しく攪拌しつつ100℃に2時間加熱し、次に10%のNaOH 水溶液でPH 6.7に調節した。混合物を75〜80℃で濃縮し蜂蜜様暗褐色の牛肉のフレーバーのする物質を得た。

この牛肉のフレーバーのする物質と、植物蛋白加水分解物261.3g、シュクロース59.75g、モノナトリウム グルタメート97.80g及びイノシン酸とグアニル酸の1:1重量比混合物17.15gを水500mlにとかし、激しく攪拌しつつ100℃に6時間加熱し、冷却して牛肉抽出物の代用として適した組成物を得た。

上記方法を、アミノ酸、糖、植物蛋白加水分解物及びβ-リボスクレオチドの濃度を各々変えて繰返し実施した。何れの場合にも満足すべき牛肉のフレーバーのする組成物が得られたが、それらの各組成を示せば第1表の如くである。

第 1 表

| アラビノース<br>デキストロース<br>システイン、* | 植物蛋白<br>加水分解物、 | β-リボスクレオチド | アラニン | グリシン | シュクロース | MSG ** |
|------------------------------|----------------|------------|------|------|--------|--------|
| 重量部                          | 重量部            | 重量部        | 重量部  | 重量部  | 重量部    | 重量部    |
| 1                            | 3              | 0.30       | 0.18 | 0.09 | 1.2    | 3.0    |
| 1                            | 5              | 0.30       | 0.10 | 0.05 | 1.2    | 7.65   |
| 1                            | 5              | 0.30       | 0.10 | 0.05 | 1.2    | 4.0    |
| 1                            | 3              | 0.2        | 0.10 | 0.05 | 1.2    | 4.0    |
| 1                            | 3              | 0.2        | 0.05 | 0.05 | 1.2    | 2.0    |
| 1                            | 3              | 0.02       | 0.05 | 0.05 | 1.0    | 2.0    |

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\* 牛肉のフレーバーのする物質混合重量  
\*\* モノナトリウム グルタミン酸

### 実施例 3

実施例2の方法により、又最終加熱工程の前に水500mlに牛肉脂肪200gを加えて、ローストミートのにおいと味のするグレービーを作るのに適した牛肉のフレーバーのする組成物を作った。

100℃に6時間加熱した後、165gの脂肪をすくい取り、水118gを含みグレービーを作るのに用いる生成物689gを残存せしめた。実施例2の表1に記載の調味組成物とアラビノゼーデキストローゼンステイン混合物1重量部当り0.5部重量部の牛肉脂肪を用いて上述の方法を繰返しローストミートのにおいとフレーバーのするグレービーペースを得た。

### 実施例 4

システイン塩酸塩13.30g、デキストローゼ33.24g、アラビノゼ26.09g、モノナトリウムグルタミン酸26.09g、グリシン塩酸塩6.65g及びアラニン13.30gを水66.48gに溶解して、混合物を90℃に加熱し、同温度に激しく攪拌しつつ2時間保った。混合物を20℃に冷却し、水99.71gを加えた。50%苛性ソーダ水溶液を12.8ml加えて混合物のpHを6.8にした。得られた牛肉のフレーバーのする物質を激しく攪拌しつつ、これに166.19gのシュクローズ、531.80gのモノナトリウムグルタミン酸、99.71gの牛肉脂肪、及び731.23gの植物蛋白加水分解物を加えた。激しく攪拌しつつ混合物を70℃に加熱し、この温度に4時間保った。混合物を50～55℃に冷却し、ジナトリウムイノシネートとジナトリウムグアニレート50:50重量混合物39.89gを混合し15分間混合を続け食品調味用組成物を得た。

### 実施例 5

ジナトリウムイノシネートとジナトリウムグアニレートの50:50混合物の代りにジナトリウムグアニレート39.89gを用いて実施例4の方法を繰返し実施した。食品の調味用として適した組成物を得た。

### 実施例 6

システインの代りに13.30gのシスチンを用

いて実施例4の方法を繰返し実施し、食品の調味用として適した組成物を得た。

### 参考例 1

(1) 米国特許第2934437号の例Iの方法に正確に従って褐色の溶液を製造した。

(2) 上記の方法で用いたD-リボースの代りにL-アラビノースを用いて上記の特許の例Iの方法に従い第2の褐色の溶液を製造した。ここでL-アラビノースを用いた理由はL-アラビノースが本発明において好適なペントースであるからである。

(3) 上記の米国特許の例Iに従い、D-リボースの代りにL-アラビノースを用い、そして混合物を90～95℃で2時間加熱して第3の褐色の溶液を製造した。

試験用の最適濃度を決定する目的で4名の味覚パネル試験官に上記(1)、(2)および(3)の溶液をそのまま、また水の1, 2, 3, 4および6部で希釈した後に試験させた。

この結果、溶液1部を水3部で希釈したものが最も良好であることが見出された。これより希釈度の低いものは苦味がありかつ非常に不快であった。一方希釈度の大きいものは本発明のビーフのフレーバーを有する組成物と比較するには水気の多い味であった。

次にイソシン酸ジナトリウムとグアニル酸ジナトリウムの混合物の代りに5'-イノシン酸ナトリウムを用いて本発明の例1の方法に従って製造した市販の生成物(Pfizer Meat Flavor, Type MF-2 (ロット番号68962))の5gを水100mlに加えて実験上試験に最適であることが示された5%の濃度の溶液を得た。

### 結 果

上記の試料で試験した結果、味覚のパネル試験官は全員が下記の通りの結論を出した。

(a) 前記(1)、(2)および(3)の溶液の1:3希釈物は全て味が悪く、幾分不快なフレーバーを有し、明らかにビーフではないがある種の肉に僅かに似たフレーバーを有した。

(b) 本発明のビーフのフレーバーを有する組成物の5%溶液はビーフ・ブロスに非常に似た味を

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有し、快くかつ食欲を誘発するものであつた。  
この試料は先行技術の3種よりも非常に優れた  
味のものであつた。

## 参考例 2

例2による組成物に関して、下記のごとく調整  
した3種類の試料についてパネル分析を実施した。  
6 9 7 0 - 3 A

|               |           |
|---------------|-----------|
| デキストロース       | 1 2 0 5 g |
| L(+)アラビノース    | 9.7 5 g   |
| グルタミン酸モノナトリウム | 9.7 5 g   |
| L-システイン       | 6.8 0 g   |
| $\beta$ -アラニン | 4.6 5 g   |
| グリシン          | 3.3 0 g   |

上記の成分を攪拌しかつ僅かに温めながら(約  
35℃)水300mlに溶かした。僅かに混濁した  
ほとんど無色の溶液が得られた。容量、328ml。  
この溶液を等量の2部に分けた。1部6970-  
3 Aのラベルを付け、冷蔵庫に貯蔵した。(例2  
の最初の成分を水300mlに溶かしたもの)  
6 9 7 0 - 4 B

上記で得られた第2の部分、攪拌器、温度計  
および真空濃縮器を備えた300ml容の3頸のフ  
ラスコに移した。これを激しく攪拌しながら  
115-120℃に維持した油浴を用いて100  
℃で2時間加熱し、室温まで冷却し、次いで10  
% NaOH 水溶液の15.3mlでpH 3.5からpH  
6.7に調節した。

次に蒸留用に濃縮器を付け、圧力を調節して  
75-80℃の内部温度を維持しながら反応混合  
物をハチミツの稠度になるまで濃縮した。この濃  
縮物27.1gをビンに移し、6970-4 Bのラ  
ベルを付け、冷蔵庫で貯蔵した。

## 6 9 7 0 - 7 C

例2に示した通りのビーフエキ代替物の完全  
な製品を1gのスケールで製造した。

|             |         |
|-------------|---------|
| デキストロース     | 4.0 2 g |
| L(+)アラビノース  | 3.2 5 g |
| グルタミン酸ナトリウム | 3.2 5 g |
| L-システイン     | 2.1 7 g |

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|               |          |
|---------------|----------|
| $\beta$ -アラニン | 1.5 5 g  |
| グリシン          | 1.1 0 g  |
| 水             | 1 0 0 ml |

上記の成分を、攪拌器、温度計および真空濃縮  
器を備えた250mlの3頸フラスコに入れた。反  
応体を100℃に加熱し、激しく攪拌しながらこ  
の温度で2時間維持した。混合物を次に室温まで  
冷却し、10% NaOH 水溶液の10.0mlでpH  
10を3.5から6.7に調節した。この溶液を次いで  
75-80℃、圧力<180mmで水を蒸発させる  
ことによりハチミツの稠度まで濃縮して濃縮物の  
18.5gを得た。

上記の濃縮物に下記の成分を加えた：

|                                                    |          |
|----------------------------------------------------|----------|
| マギーの4 BE ベースト(ネッス<br>ル社製、加水分解した植物性蛋白……87.1 g<br>質) |          |
| 蔗糖……………                                            | 19.9 g   |
| グルタミン酸モノナトリウム……………                                 | 3.26 g   |
| イノシン酸ジナトリウムとグアニ<br>ル酸ジナトリウム1:1混合物……………             | 5.72 g   |
| 水……………                                             | 167.0 ml |

得られた混合物を500ml容の3頸フラスコに移  
し、激しく攪拌しながら100℃で6時間加熱し  
た。生成物を次いで冷却し、冷蔵庫で貯蔵した。  
最終重量は313.8gで、これに6970-7 C  
のラベルを付けた。

これらのパネル試験は予備実験で上記の試料の  
各々の最適濃度を決定した後にこれらをアロマと  
フレーバーについて比較して行つた。試料Aは  
20%の濃度(20mlを水で100mlに希釈)で  
使用し、試料Bは3%(3g/100ml)、試料  
Cは6%(6g/100ml)で使用し、全ての試  
料はパネル評価中約50℃に維持した。パネル試  
験官にこれらの3種類の試料と質問事項を提供し  
てアロマとフレーバーの両方の試験を要求し、次  
いで好ましい順序を示すように要求し、さらに試  
験官には各々の試料についての簡単な印象を記載  
することを要求し、その結果として10名の試験  
官の全員が下記の如く同じ順序で試料を等級付け  
した。

選択順位第1位 …………… C  
" 第2位 …………… B

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選択順位第3位 ----- A ※ーフフレーバーであると判定し、そしてAおよび試験官の殆んどが試料Cを良好または満足なビ※ Bについてはしばしば「不快」であると報告した。

本願発明の例2により製造したビー  
フェキス代替物の試料の感覚評価

| パネル<br>試験官名 | 選 択 順 位 |    |    | 所 見                       |                         |
|-------------|---------|----|----|---------------------------|-------------------------|
|             | 1位      | 2位 | 3位 | ア ロ マ                     | フ レ ー バ ー               |
| K.T         | C       | B  | A  | Cーコラル (Corral)<br>ビーフに類似。 | 満足なビーフフレーバー。            |
|             |         |    |    | Bー僅かに肉様。                  | 不快、水っぽい。                |
|             |         |    |    | Aー不快、イオウ臭い。               | 酸味あり、不快。                |
| N.B.K       | C       | B  | A  | Cー肉様。                     | 良好なビーフフレーバー。            |
|             |         |    |    | Bーイオウ臭い。                  | 味気ない (flat)、イオウ臭い。      |
|             |         |    |    | Cーイオウ臭い。                  | 塩味強く、イオウ臭い。             |
| R.S         | C       | B  | A  | Cービーフ。                    | かなり良好なブイヨン。             |
|             |         |    |    | Bーブイヨン。                   | 味気ない。                   |
|             |         |    |    | Aー魚臭い。                    | 不快。                     |
| W.W.        | C       | B  | A  | Cーやや良好なロースト<br>ミート。       | 非常に豊かなビーフ・ブ<br>ロス。      |
|             |         |    |    | Bーイオウ臭く肉様でない。             | 酸味あり、肉様でない。             |
|             |         |    |    | Aー臭気なし。                   | 酸味あり、肉の品質なし。            |
| A.T.        | C       | B  | A  | Cー優れている。ビーフ<br>様。         | 顕著に塩味あり、ビーフ様。           |
|             |         |    |    | Bーイオウ臭い、化学剤<br>様である。      | 軽度のイオウ臭、甘味一<br>塩味あり。    |
|             |         |    |    | AーBに類似するがさら<br>にイオウ臭い。    | 酸味あり、塩味あり、イ<br>オウ臭あり。   |
| B.T.        | C       | B  | A  | Cーブイヨン。                   | 塩味のある、甘味のある<br>ブイヨンレバー。 |
|             |         |    |    | Bー弱い。                     | 不快、塩味のある、イオ<br>ウ臭い。     |
|             |         |    |    | Aー弱い。                     | 酸味あり、非常に不快。             |
| R.D.        | C       | B  | A  | Cービーフブイヨン。                | ビーフ・ブイヨン、酸味<br>あり。      |
|             |         |    |    | Bーポップコーン様。                | 酸味あり。                   |
|             |         |    |    | Aーイオウ臭い、"濡れ<br>た犬"の臭い。    | 非常に酸味あり、不快。             |

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| 15     |   |     | 16              |                    |
|--------|---|-----|-----------------|--------------------|
| D. H.  | C | B A | C—ビーフ様。         | 塩味のあるビーフブロス。       |
|        |   |     | B—「濡れた犬」の臭い。    | かなり良好なビーフブロス。      |
|        |   |     | A—古い肉。          | 薬品臭い、腐った肉。         |
| Ph. T. | C | B A | C—焼肉。           | 非常に快い肉ブロス。         |
|        |   |     | B—快い肉ブロス。       | 酸味あり、軽度の肉ブロス。      |
|        |   |     | A—濡れた毛髪様と肉ブロス。  | 僅かに肉様のクエン酸溶液に似ている。 |
|        |   |     | C—強い典型的なビーフブロス。 | HVP の味、幾分鋭い。       |
|        |   |     | B—弱いしかし快い。      | 新鮮でない味、口当たりがよい。    |
|        |   |     | A—非常に弱い。        | 酸味あり、非常に不快。        |

A—水に入れた6970-3Aの20%(V/V)溶液(20mlを100mlに希釈)

B—水に入れた6970-4Bの3%(W/V)溶液(3.0gを100mlに溶解)

C—水に入れた6970-7Cの6%(W/V)溶液(6.0gを100mlに溶解)

全ての試料は試験期間中50℃の水浴に入れて温めた。

#### 追加の關係

本願發明は特許第602791号(特公昭44-25-31751号)發明の追加發明であつて、上記原發明に於てはヘキソーズまたはペントーゼモノサツカライドをシステインと水の存在で混合しビーフの風味を有する混合物が得られるまで加熱し、混合物1重量部に対し植物性蛋白質加水分解物約300.5~1.5部及びβ-リボヌクレオチド約0.5~1.5部を加え、少くとも70℃に約2時間加熱していたが、本願發明はシステインのみならずシスチンも有効であることの発見に基き使用可能アミノ酸の点で原發明の範圍を拡大せるものである。

#### ◎特許請求の範圍

1. ヘキソーズ又はペントーゼ単糖類とシスチン

又はシステインの混合物を水の存在で牛肉のフレーバーのする混合物が得られる迄加熱し、前記牛肉のフレーバーのする混合物1重量部当り、シスチンを用いた場合には約3乃至約1.5重量部の、又システインを用いた場合には約3乃至約5重量部以下の植物蛋白質加水分解物と約1.5重量部のβ-リボヌクレオチドとを加え、混合物を少くとも70℃に約2時間加熱することからなる牛肉のフレーバーのする物質の製造方法。

#### ◎引用文献

米国特許 2934437

## United States Patent Office

3,761,287  
Patented Sept. 25, 1973

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3,761,287

PROCESS FOR THE MANUFACTURE OF  
MEAT FLAVORSKurt Jaeggi, Dubendorf, Switzerland, assignor to  
Givaudan Corporation, Clifton, N.J.

No Drawing. Filed Nov. 24, 1971, Ser. No. 282,887

Claims priority, application Switzerland, Dec. 23, 1970,  
19,071/70

Int. Cl. A23J 1/26

U.S. Cl. 99—140 R

16 Claims

## ABSTRACT OF THE DISCLOSURE

A process for the manufacture of flavors and aromas for food by heating a mixture containing a pentose, a polyalcohol, proline, methionine, cysteine and possibly other amino acids.

## RELATED APPLICATION

This application claims priority from applicant's co-pending Swiss application S.N. 19,071/70, filed Dec. 23, 1970.

## FIELD OF THE INVENTION

Synthetic meat aromas.

## SUMMARY OF THE INVENTION

The present invention relates to synthetic meat aromas. More particularly, the invention is concerned with a process for the manufacture of synthetic meat aromas, with foodstuffs, delicacies and feedstuffs containing said aromas and with a method for the aromatization of foodstuffs, delicacies and feedstuffs by means of said aromas.

According to the process provided by the present invention, synthetic meat aromas are manufactured by heating a charge comprising a pentose, a polyalcohol, and a mixture of amino acids, said mixture containing at least some proline, cysteine, and methionine.

The amino acids aforesaid can be employed as such or in the form of derivatives or salts thereof which form the free amino acids under the conditions of the process.

DESCRIPTION OF THE PREFERRED  
EMBODIMENTS

The amino acids charged may comprise not only proline, cysteine and methionine, but may also comprise other amino acids; for example, smaller amounts of the amino acids known to occur in meat, such as, for example, alanine, arginine, cystine, glycine, histidine, isoleucine, leucine, lysine, serine, threonine, valine, aserine, carnosine or taurine. There may also be utilized the acid salts of these amino acids. Any physiologically acceptable amino acid salts may be utilized, however, the hydrochlorides were deemed especially suitable.

The amount of amino acids present in the mixture expediently amounts to 2 to 40%, preferably 5 to 30 wt. percent. If less than 2 wt. percent of amino acids are present, no powerful aroma is obtained and, indeed, it can even be markedly weak.

If more than 40 wt. percent are present, undesired side-reactions can occur.

According to a preferred embodiment of the present process, proline is employed as the main component of the three amino acids aforesaid. The use of a mixture in which over 50 wt. percent of the amino acid ingredients consists of proline is preferred. On the other hand, how-

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ever, this amount should not exceed 85 to 90%, since otherwise the aroma which is obtained is reminiscent of bread.

Ribose is preferably employed as the pentose, although other pentoses such as, for example, arabinose or xylose can also be employed. Mixtures of such pentoses can also be employed. The amount of pentose present expediently amounts to 0.4 to 18 wt. percent and preferably 1 to 10 wt. percent.

As polyalcohols there can be employed, for example, trihydric alcohols such as glycerine, or glycols such as, for example, propylene glycol. The polyalcohol can be present in the mixture in an amount of 9 to 90 wt. percent, preferably 40 to 90 wt. percent.

Suitable proportions of the main components of the mixture used in accordance with the present invention are given in the following Table I:

TABLE I

|             | Percent by weight |
|-------------|-------------------|
| Proline     | 1.0-40            |
| Cysteine    | 0.1-30            |
| Methionine  | 0.1-16            |
| Pentose     | 0.4-18            |
| Polyalcohol | 9.0-90            |

As a rule, the desired meat aroma is formed when the mixture used as the starting material is heated to temperatures eg 90°-170° C., in particular to about 110°-130° C. The heating time is normally inversely proportional to the heating temperature; it expediently amounts to about 15 minutes to 2 hours.

Besides the aforementioned main components, there can also be present in the mixture other ingredients such as aroma enhancers [e.g. 0.1-200% monosodium glutamate, 0.1-100% disodium inosine-5'-monophosphate (IMP) and disodium guanosine-5-phosphate (GMP)], fats (e.g. groundnut oil) or special aroma substances (e.g. butter or synthetic butter composition).

The products obtained after the heating are highly concentrated synthetic meat aromas which may be diluted or distributed in edible materials in a manner known per se. They can be converted according to methods which are known per se into the usual forms of presentation such as solutions, pastes or powders. The product can be spray-dried, vacuum-dried or lyophilized. As carrier materials there can be used, for example, gum arabic, salts or brewers yeast or similar adsorbencies. Indoles, maltol, dieneals, spice oleoresins or smoke aromas can also be added as flavour-improvers.

The thus formulated products can serve for the aromatization of many kinds of foodstuffs, delicacies and feedstuffs; for example, meat-like products manufactured from natural or synthetic proteins as well as chips etc.

The following Table II gives a basis for suitable concentrations of the synthetic meat aromas in various forms of presentation.

TABLE II

| Form of presentation            | General, percent | Preferred, percent |
|---------------------------------|------------------|--------------------|
| Solutions                       | 1-100            | 10-80              |
| Pastes                          | 1-100            | 10-80              |
| Spray-dried powder              | 3-80             | 10-50              |
| Lyophilized vacuum-dried powder | 2-30             | 8-18               |

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The following examples illustrate the present invention:

## Example 1

An intimate mixture containing:

|              |     |      |
|--------------|-----|------|
| Proline      | g.  | 1.5  |
| Cysteine     | g.  | 1.25 |
| Methionine   | g.  | 0.3  |
| Ribose       | g.  | 0.8  |
| Butter aroma | g.  | 0.2  |
| Glycerine    | ml. | 20   |

is heated with constant stirring to 120° C. held at this temperature for 1 hour. The resulting product has a powerful meat aroma. By dilution with hot water (2 g. to 1 litre), there is obtained a clear broth with a marked meat aroma.

## Example 2

An intimate mixture containing:

|               |     |     |
|---------------|-----|-----|
| Proline       | g.  | 16  |
| Cysteine      | g.  | 2.5 |
| Methionine    | g.  | 0.6 |
| Ribose        | g.  | 2.5 |
| Glycerine     | ml. | 40  |
| Butter        | g.  | 0.2 |
| Groundnut oil | ml. | 20  |
| IMP           | g.  | 20  |

is cautiously heated with stirring to 120° C. and with constant further stirring held at this temperature for 1 hour. Addition of 0.2% of this product to a sauce imparts to the latter a marked aroma of boiled meat.

## Example 3

An intimate mixture containing:

|               |     |     |
|---------------|-----|-----|
| Proline       | g.  | 5.0 |
| Cysteine      | g.  | 5.0 |
| Methionine    | g.  | 1.2 |
| Ribose        | g.  | 3.2 |
| Glycerine     | ml. | 5   |
| Butter        | g.  | 0.6 |
| Guanilic acid | g.  | 20  |
| GMP           | ml. | 15  |

is cautiously heated with stirring to 120° C. and then held at this temperature for 1 hour. The product has a flavour of boiled meat with a fatty note. By mixing this product with 0.1-5%, preferably 0%, of an artificial smoke aroma, there results a product with marked ham note which can be used for aromatizing broths, meat substitutes from protein-containing materials, crackers or potato crisps.

## Example 4

An intimate mixture of:

|            |     |     |
|------------|-----|-----|
| Proline    | g.  | 30  |
| Cysteine   | g.  | 7   |
| Methionine | g.  | 2   |
| Ribose     | g.  | 7   |
| Glycerine  | g.  | 100 |
| Water      | ml. | 50  |

is cautiously heated with stirring to 120° C. and held at this temperature for 1 hour. The product has marked roast beef flavour. It can, for example, be used in amounts of 0.2-4% for imparting the typical roast beef flavour to purely synthetic fibrous meat substitute.

4

## Example 5

An intimate mixture of:

|               |     |      |
|---------------|-----|------|
| Proline       | g.  | 7    |
| Cysteine      | g.  | 4.0  |
| Methionine    | g.  | 0.4  |
| Xylose        | g.  | 3.5  |
| Glycerine     | ml. | 50   |
| Butter aroma  | g.  | 0.25 |
| GMP           | g.  | 10   |
| Groundnut oil | ml. | 50   |
| Water         | ml. | 15   |

is cautiously heated with stirring to 120° C. and held at this temperature for 1 hour. The product can be added to a waffle filling to which it imparts a delicious flavour of roast liver in amounts of about 1.5%.

## Example 6

An intimate mixture of:

|            |     |      |
|------------|-----|------|
| Proline    | g.  | 28.0 |
| Cysteine   | g.  | 6.6  |
| Methionine | g.  | 1.6  |
| Ribose     | g.  | 6.8  |
| Glycerine  | ml. | 57.0 |
| Water      | ml. | 50.0 |

is cautiously heated with stirring to 120° C. and held at this temperature for 1 hour. The product has a marked roast beef flavour and can be used for the manufacture of a "dip" for potato crisps.

## Example 7

A potato crisp dip is manufactured according to the following process:

|                      | G.  |
|----------------------|-----|
| Product of Example 6 | 5.8 |
| Edible curd          | 200 |
| Whipped cream        | 100 |
| Salt                 | 2   |
| Paprika              | 0.1 |
| Pepper               | 0.1 |
| Chives (fresh)       | 1.5 |

The edible curd is firstly stirred to a fine mass and the whipped cream is cautiously admixed therewith. The spices are added to the resulting homogeneous mass.

I claim:

1. A process for the manufacture of synthetic meat
2. A process according to claim 1, wherein the said amino acids comprise 5 to 30 wt. percent of the reactants.
3. A process according to claim 1, wherein proline, cysteine and methionine are the only amino acids charged.
4. A process according to claim 1, wherein 50 to 90 wt. percent of the amino acid mixture consists of proline.
5. A process according to claim 1, wherein the reactants comprise 1 to 40% proline, 0.1 to 30% cysteine, 0.1 to 16% methionine, 0.4 to 18% of a pentose and 9 to 90% of a polyalcohol.
6. A process according to claim 1, wherein the reactants also comprise water.
7. A process according to claim 1, wherein the reactants are heated to a temperature of between 110° C. and 130° C.
8. A process according to claim 1, wherein said pentose comprises 0.4 to 18 wt. percent of the reactants.

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9. A process according to claim 8, wherein said pentose comprises 1 to 10 wt. percent of the reactants.

10. A process according to claim 9, wherein the pentose is ribose.

11. A process according to claim 1, wherein 9 to 90 wt. percent of the reactants comprise a polyalcohol.

12. A process according to claim 11, wherein 40 to 90 wt. percent of the reactants comprise a polysaccharide.

13. A process according to claim 12, wherein the polyalcohol is glycerine.

14. A synthetic meat flavour composition, manufactured according to the process of claim 1.

15. A foodstuff which comprises an olfactible amount of a synthetic meat flavour composition of claim 14.

16. A method for the aromatization of foodstuffs which comprises adding an olfactible amount of a synthetic meat flavour composition of claim 14 to foodstuffs.

6

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MORRIS O. WOLK, Primary Examiner  
S. MARANTZ, Assistant Examiner

U.S. Cl. X.R.

99—144

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| 特許庁 | 特許出願 | 特許出願番号 | 特許出願日 |
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| 特許庁 | 特許出願 | 特許出願番号 | 特許出願日 |

# 日本国特許庁 公開特許公報

特許願 (特許法第1条第1項の  
規定による特許出願)  
昭和50年10月24日

①特開昭 51-63971  
③公開日 昭51. (1976) 6.2  
②特願昭 50-127554  
②出願日 昭50. (1975) 10.24  
審査請求 未請求 (全4頁)

1. 発明の名称  
肉アロム、嗜好品の風味付けの方法  
2. 原特許出願の表示  
昭和46年特許第100261号  
(昭和46年12月13日)  
3. 発明者  
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庁内整理番号  
6580 4P  
6771 4P

|                          |                                                    |
|--------------------------|----------------------------------------------------|
| ②日本分類<br>34 K3<br>34 F04 | ③Int. Cl. <sup>3</sup><br>A23L 1/227<br>A23L 1/231 |
|--------------------------|----------------------------------------------------|

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方式  
審査

1. 発明の名称  
食品、嗜好品の風味付け方法  
2. 特許請求の範囲  
プロリン、システイン、メチオニン、ペントースおよびポリアルコールを含む混合物を加熱することにより製造した合成の肉アロムを食品又は嗜好品に加えることを特徴とする、食品、嗜好品の風味付け方法。  
3. 発明の詳細な説明  
本発明は合成の肉アロムより食品又は嗜好品に風味をつける方法に関する。  
本発明方法で使用する合成アロムはプロリン、システイン、メチオニン、ペントースおよびポリアルコールを含む混合物を加熱してつくる。  
前記アミノ酸はそのまゝ用いてもよく、又はその工程の条件で遊離アミノ酸を形成するその誘導体もしくは塩の形で用いてもよい。たとえばシステイン塩酸塩をシステインの代りに用いてもよい。プロリン、システインおよびメチオニンの他に

の混合物はその他のアミノ酸、たとえば肉の中に存在することが知られている少量のアミノ酸、たとえばアラニン、アルギニン、シスチン、グリシン、ヒスチジン、イソロイシン、ロイシン、リジン、セリン、スレオニン、バリン、アンセリン、カルノシンもしくはタウリンを含むしてもよい。  
この混合物中のアミノ酸の量は、少なくとも10重量%、望ましくは少なくとも30重量%であることが便宜である。2重量%以下のアミノ酸では強力な風味が得られず、事実それは非常に弱い。40重量%以上では望ましくない酸反響が起り得る。  
本発明方法の所望の様態によれば、前記三つのアミノ酸の主成分としてプロリンを用いる。そのアミノ酸成分の30重量%以上がプロリンから成る混合物を用いることが望ましい。しかし、一方この量は少なくとも10%を越えてはいけない。何となれば、さもないと得られる風味がパンを思ひ出させることになる。  
ペントースとしては、たとえば、アラビノースもしくはキシロースを用いてもよいが、リボース

を用いると、 $\alpha$ が定まらぬ。これらのベンチマークの  
割合を算出する。ベンチマークの値は、 $\alpha$ が  
なし/ありとも、 $\beta$ がなし/あり/なし/0  
であることが予想される。

ホリアルカーネルとして、たゞ又は、三個アル  
コール、カニ油、酢、サリチン、又はサリコール、  
たゞ又は、二個のサリチン、又はサリコールを用いる。その混  
合物中のホリアルカーネルの量は、たゞ又は、その重量  
%、強しくは、その割合の重量%である。

本発明によもて用ゐられる重合物の主成分の炭素原子数を次の表に示す。

|            | Σ 189      |
|------------|------------|
| 000000     | 1.0 = 5.5% |
| 000000     | 0.1 = 3.0% |
| 000000     | 0.1 = 1.6% |
| 000000     | 0.4 = 1.2% |
| 000000 - 0 | 7.0 = 7.0% |

たを見れば、フラスコアガム、指輪もしくはビーズ類、珍しくは和紙の紙入れ物等を用いることが出来る。インクボール、マーカーボール、ビーズボール、密着剤又はマーカーボールとくく、人眼で見え易い材料は物と見えて、また見えない。

[illegible]

この二種は、必ずしも、そのその会派の排外性  
が、露骨な排外主義を以てする。

| 品名       | 数量の割合    | 重量の割合    |
|----------|----------|----------|
| 小麦       | 1 - 100% | 10 - 10% |
| 大麦       | 1 - 100% | 10 - 90% |
| 小麦、大麦    | 3 - 10%  | 13 - 33% |
| 小麦、大麦、小麦 | 2 - 30%  | 8 - 18%  |

2013年12月15日

昭和十一年(1937)年  
 印刷して、加島の野フスマはその乾燥材料と  
 して用いる術を得る事になり、ノラの草、草に付  
 ノラの<sup>①</sup>・ノラの<sup>②</sup>の草を乾燥したものを採る。加  
 島時期は加島製法に改良するの第一であり、  
 採るべきでないし、時間が無駄である。

前記述以外の化合物の割合は平均値の範囲内、  
 水と比べ、風乾乾燥物に水と比べ、 $0.1 \sim 2.0$  の  
 マグネシウム塩はノボリウム、 $0.1 \sim 0.5$  のカル  
 シウムトリウムイオン、 $0.1 \sim 0.5$  のカルシウム  
 (DM) およびカルシウムがアルミニウム、 $0.1 \sim 0.5$   
 のカルシウム (DM) であり、塩類（水と比べ、常乾燥  
 物）及び結晶の水分子（水と比べ、 $0.1 \sim 0.5$ ）  
 は含有成分（水と比べ）を含有しないといふ。

加糖醬に加入せる生油類は既述した通り其の含有  
量の異なるものと、これに糖類を加へてよく、又  
は食用とする物にそれ自体糖類の添加を必要とす  
るもの。それは本述糖類の方法による糖類の含有  
量、先づ是は、糖類、一—又一—に糖類に  
添加してよく、その生油類は糖類に、砂糖  
にもしくは糖類に添加してもよい。然るしては、

|       |  |
|-------|--|
| 例 1   |  |
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| 例 99  |  |
| 例 100 |  |

上組織及び含有するよく似た化合物を起す中  
に於しながら、その質に差を生じ、その組織に時間  
的有つ。即ち、その生理作用は、その肉の性質を有する。  
即ち、その性質を有する（その性質を有する）。即ち、  
その性質を有する（その性質を有する）。即ち、その性質を有する（その性質を有する）。

| 品名     | 数量  | 単価   | 金額     |
|--------|-----|------|--------|
| バナナ    | 100 | 1.00 | 100.00 |
| パイナップル | 50  | 2.00 | 100.00 |
| りんご    | 100 | 0.50 | 50.00  |
| 梨      | 50  | 1.00 | 50.00  |
| みかん    | 100 | 0.50 | 50.00  |
| 柿      | 50  | 1.00 | 50.00  |
| 葡萄     | 100 | 0.50 | 50.00  |
| イチゴ    | 50  | 1.00 | 50.00  |
| 合計     |     |      | 500.00 |

100g 20g

上記成分を含有するよく混ぜた混合物を加熱しながら室温で120℃に加熱し、さらにこれを冷却しながらこの状態に1時間保つ。この生成物の2gをソースに添加すると、そのソースは通常の肉の風味を示す。

例 3

|       |       |
|-------|-------|
| プロリン  | 6.0g  |
| シスチン  | 5.0g  |
| ノチオン  | 1.2g  |
| リボース  | 3.2g  |
| グリセリン | 1ml   |
| バター   | 0.2g  |
| ゲフェル  | 2.0g  |
| 合計    | 15.6g |

上記成分を含有するよく混ぜた混合物を加熱しながら室温で120℃に加熱し、次にこの状態に1時間保つ。この生成物は脂肪質の特性を示し、通常の肉の風味を示す。この生成物を0.1-5g、好ましくは10gの人造肉製剤に添加する。

7

|       |       |
|-------|-------|
| ノチオン  | 0.4g  |
| リボース  | 3.5g  |
| グリセリン | 5.0ml |
| バター製剤 | 0.25g |
| 合計    | 10.8g |
| ゲフェル  | 5.0ml |
| 水     | 1.5ml |

上記成分を含有するよく混ぜた混合物を加熱しながら室温で120℃に加熱し、この状態に1時間保つ。この生成物をソースの結晶性添加すると、それはわが国の胃でそれおいしいソースレベルの風味を与える。

例 6

|       |        |
|-------|--------|
| プロリン  | 28.0g  |
| シスチン  | 6.6g   |
| ノチオン  | 1.6g   |
| リボース  | 6.8g   |
| グリセリン | 57.0ml |
| 水     | 50.0ml |

上記成分を含有するよく混ぜた混合物を加熱し

例 4

と、通常の肉の特性を示す生成物が得られ、これはプロセス、タンパク質材料からの肉の代替品、クラッカーもしくはポテトチップスに用いられるのに用いることができる。

例 4

|       |       |
|-------|-------|
| プロリン  | 3.0g  |
| シスチン  | 7.9   |
| ノチオン  | 2.9   |
| リボース  | 7.9   |
| グリセリン | 10.0g |
| 水     | 5.0ml |

上記成分を含有するよく混ぜた混合物を加熱しながら室温で120℃に加熱し、この状態に1時間保つ。この生成物は通常のソースとソースの風味を示す。たとえば、純粋な肉の風味の代替品にこの典型的なソースとソースの風味を与えるためにそれを0.2gを用いればよい。

例 5

|      |      |
|------|------|
| プロリン | 7.9  |
| シスチン | 4.0g |

8

ながら室温で120℃に加熱し、この状態に1時間保つ。この生成物は通常のソースとソースの風味を示し、これはポテトチップスに用いられる。「ガイップ（ガイップ）」の製造に用いられる。

例 7

ポテトチップスガイップを次のように作る。

|              |       |
|--------------|-------|
| 他の生成物        | 5.8g  |
| 食用カード        | 20.0g |
| あわ立てクリーム     | 10.0g |
| 塩            | 2.9   |
| バブリーカ        | 0.1g  |
| としら          | 0.1g  |
| チャイブ（chives） | 1.5g  |
| （新鮮なもの）      |       |

まず食用カードをきき上げてこすのち、これにあわ立てクリームを添加して混ぜる。これら均一な混合物を添加する。

代理人 櫻 村 昭

例 10

6. 添付書類の目録

|         |                  |        |                                      |
|---------|------------------|--------|--------------------------------------|
| 添 付 書 類 | 1 添 50 要約表及びその英文 | 各 1 添  | 原本は特許官署で22.1.2024/5<br>にある1-1の57提出する |
| 添 付 書 類 | 1 添 50 要約表及びその英文 | 1 添    | 漏て補充致します                             |
| 1 添 50  | 1 添 50           | 1 添 50 | 1 添                                  |

7. 前記以外の発明者、特許出願人または代理人

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(2) 出 願 人

(3) 代 理 人

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 氏 名 (6772)弁護士 西 立 人

| Electronic Acknowledgement Receipt          |                                          |
|---------------------------------------------|------------------------------------------|
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| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Shannon Stadnick       |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
| <b>Receipt Date:</b>                        | 17-NOV-2017                              |
| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 09:33:43                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

| Submitted with Payment | no                                                 |                 |                                                  |                  |                  |
|------------------------|----------------------------------------------------|-----------------|--------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                                    |                 |                                                  |                  |                  |
| Document Number        | Document Description                               | File Name       | File Size(Bytes)/ Message Digest                 | Multi Part /.zip | Pages (if appl.) |
| 1                      | Information Disclosure Statement (IDS) Form (SB08) | Transmittal.pdf | 69421<br>b45d0e753e9fd957895f5f95937c92fab9471e2 | no               | 1                |
| <b>Warnings:</b>       |                                                    |                 |                                                  |                  |                  |

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|-------------------------------------------------|----------------------------------------------------|--------------------------------|-----------------------------------------------------|----|----|
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
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| 2                                               | Information Disclosure Statement (IDS) Form (SB08) | 1449.pdf                       | 120884<br>aa5609cf56e6c512499eed903f854fe11f2891a4  | no | 1  |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
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| 3                                               | Foreign Reference                                  | EP0136428.pdf                  | 942655<br>4c410ad7dad174bece366cc0a4e92798789900f4  | no | 29 |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
| 4                                               | Foreign Reference                                  | EP2943072.pdf                  | 5424594<br>fc51a34a632991d05a8edf293229fcfd5de41017 | no | 46 |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
| 5                                               | Foreign Reference                                  | WO2014110532.pdf               | 4412492<br>d43052b1572fe996f2490e2d418ded1a8a333ee9 | no | 88 |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
| 6                                               | Non Patent Literature                              | ESSR_EP15774164_2017_10_27.pdf | 380986<br>9060cbe60b5d6b1e092b8eb63d36ab514c4d6dae  | no | 11 |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
| 7                                               | Foreign Reference                                  | JPS4222194.pdf                 | 342899<br>165094e6eb3e6cda84973220faca383b5ccdad25  | no | 3  |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                |                                                     |    |    |
| 8                                               | Foreign Reference                                  | JPS4939824.pdf                 | 680694<br>ea9ae23e605de2578962aab9382518e5e3601cd6  | no | 8  |
| <b>Warnings:</b>                                |                                                    |                                |                                                     |    |    |

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| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                |                                          |    |   |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Foreign Reference | JPS5163971.pdf | 442625                                   | no | 7 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                | e703bedc23d60499a9ac628547b86bfd801a46fd |    |   |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                |                                          |    |   |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                |                                          |    |   |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                | 12817250                                 |    |   |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/>         If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/>         If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/>         If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                   |                |                                          |    |   |

Attorney Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                        |                                          |             |              |
|------------------------|------------------------------------------|-------------|--------------|
| First Named Inventor : | Marija Vrljic                            | Art Unit :  | 1791         |
| Serial No. :           | 14/796,970                               | Examiner :  | Elizabeth A. |
| Filed :                | July 10, 2015                            |             | Gwartney     |
|                        |                                          | Conf. No. : | 8501         |
| Title :                | METHODS AND COMPOSITIONS FOR CONSUMABLES |             |              |

**MAIL STOP AMENDMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 Form. Foreign patent documents and non-patent literature are enclosed. A copy of a Communication from a foreign Patent Office in a counterpart application also is enclosed.

This statement is being filed after a Request for Continued Examination (RCE) and before the mailing of a first Office Action. Therefore, no fees are believed due. If this is incorrect, please apply any charges, or credits, to Deposit Account No. 06-1050, referencing the above-indicated Attorney Docket Number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: /December 29, 2017/

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Sheet 1 of 1

|                                                                                                                                                          |                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                          | Applicant<br>Impossible Foods Inc.                         |                                      |                               |
|                                                                                                                                                          | Filing Date<br>July 10, 2015                               | Group Art Unit<br>1791               |                               |

| U.S. Patent Documents |           |                 |                  |          |       |          |                            |
|-----------------------|-----------|-----------------|------------------|----------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee | Class | Subclass | Filing Date If Appropriate |
|                       | --        | --              | --               | --       |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |                        |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation            |    |
|                                                                   |           |                 |                  |                          |       |          | Yes                    | No |
|                                                                   | 1.        | JP S6283842     | 04/17/1987       | JAPAN                    |       |          | English Trans          |    |
|                                                                   | 2.        | SU 291395       | 06/01/1971       | USSR                     |       |          | Partial English Trans. |    |
|                                                                   | 3.        | WO 2005/046354  | 05/26/2005       | WIPO                     |       |          | English Abst.          |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                                                                                                                                                                                            |
|                                                                         | 4.        | Bastide et al., "Heme Iron from Meat and Risk of Colorectal Cancer: A Meta-analysis and a Review of the Mechanisms Involved," Cancer Prevention Research, 2011, Vol. 4, pp 177-184                                                                                                                                  |
|                                                                         | 5.        | "Elise, "Classic Meatloaf Recipe,"" Simply Recipes, 2009, <a href="https://web.archive.org/web/20090518183257/http://www.simplyrecipes.com/recipes/classic-meatloaff">https://web.archive.org/web/20090518183257/http://www.simplyrecipes.com/recipes/classic-meatloaff</a> , downloaded 22 November 2017, 11 pages |
|                                                                         | 6.        | GenBank Accession No. AAA02168.1, May 21, 1993, 1 page                                                                                                                                                                                                                                                              |
|                                                                         | 7.        | Office Action in Russian Patent Application No. 2014104812, dated May 23, 2017, 8 pages (English Translation)                                                                                                                                                                                                       |
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|                                                                         | 9.        | Topunov, AF, et al., "Hemoglobins: Evolution, Abundance, and Heterogeneity," Uspekhi Biologicheskoi Khimii, vol. 41, 2001, page 207 (partial English translation, 1 page)                                                                                                                                           |
|                                                                         | 10.       | Walter et al, "Effect of bovine-hemoglobin-fortified cookies on iron status of schoolchildren: a nationwide program in Child," Am J Clin Nutr, 1993, 57, pp. 190-194.                                                                                                                                               |

|                                                                                                                                                                              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Examiner Signature                                                                                                                                                           | Date Considered |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                 |

Substitute Disclosure Form

⑨ 日本国特許庁(JP)

⑪ 特許出願公開

⑫ 公開特許公報(A)

昭62-83842

⑤ Int.Cl.<sup>4</sup>

識別記号

庁内整理番号

⑬ 公開 昭和62年(1987)4月17日

A 23 C 9/127  
9/18

8114-4B  
8114-4B

審査請求 未請求 発明の数 2 (全8頁)

⑭ 発明の名称 凍結乾燥ヨーグルトとその製造方法

⑮ 特 願 昭60-223987

⑯ 出 願 昭60(1985)10月8日

⑰ 発 明 者 徳 丸 千 之 助 藤沢市辻堂太平台1丁目10番3号

⑱ 出 願 人 徳 丸 千 之 助 藤沢市辻堂太平台1丁目10番3号

⑲ 代 理 人 弁理士 小川 信一 外2名

## 明 細 書

### 1. 発明の名称

凍結乾燥ヨーグルトとその製造方法

### 2. 特許請求の範囲

1. ケフィア菌による牛乳の発酵生成物であり、かつ凍結乾燥された粉体状であることを特徴とする凍結乾燥ヨーグルト。
2. 牛乳にケフィア菌スターターを接種してヨーグルトを製造し、得られたヨーグルトを凍結乾燥すること特徴とする凍結乾燥ヨーグルトの製造方法。

### 3. 発明の詳細な説明

(発明の技術分野)

本発明は凍結乾燥ヨーグルトとその製造方法に関し、より詳細には長期間、安定して保存することができる粉体状のヨーグルトと、その製造方法に関する。

(従来技術)

ソ連や東欧諸国においては、コーカサス地方を起源とする発酵乳・ケフィア(Kefir)が古く

から愛飲されており、このことは、乳業関係者の間では、以前から知られていたことである。近年、発酵乳がすぐれた健康食品であるという認識と、コーカサス地方のもつ長寿イメージとが重なり、わが国のみならず欧米においても、新しいタイプの発酵乳としてケフィアへの関心は急激に高まっている。

しかし、その高まりにもかかわらず、ヨーグルトに代表される乳酸発酵単独型の発酵乳とは異なるケフィアについては、必ずしも十分に検討されているとはいえない。

特にケフィアは、熟成が長びくにつれて次第にCO<sub>2</sub>を発生して容器内圧を高めることも商品化、販売をさまたげる原因であった。

(発明の目的)

本発明は発酵乳・ケフィアのように保存中にCO<sub>2</sub>の発生による容器内圧の上昇もなく、保存、取扱が容易な粉末状ヨーグルトとその製造方法を提供することを目的とするものである。

(発明の構成)

特開昭62-83842(2)

上記目的を達成する本発明の凍結乾燥ヨーグルトは、ケフィア菌による牛乳の発酵生成物であり、かつ凍結乾燥された粉体状であることを特徴とするものである。

または本発明の凍結乾燥ヨーグルトの製造方法は、牛乳にケフィア菌スターターを接種してヨーグルトを製造し、得られたヨーグルトを凍結乾燥することを特徴とするものである。

ケフィア菌は、生物学的に1つの生体としてふるまう各種微生物が天然の共生をなすものである。

ケフィア菌微生物叢の組成には、乳酸連鎖球菌及び桿菌・酵母・酢酸菌などが含まれている。

また、ケフィア・スターターの乳酸連鎖球菌群には、ケフィア菌微生物叢の一定かつ最大の活性部分をなし、発酵の始め数時間中のスターターの酸度を急速に高めるストレプトコッカス・ラクテイス(Str.lactis)及びストレプトコッカス・クレモリス(Str.cremoris)、ロイコノストック・シトロバルム(Louconostoc citrovarum)、

ロイコノストック・デキストラニクム(Leuconostoc dextranicum) 及びストレプトコッカス・ジアセチラクテイス(Str.diacetilactis) 型の芳香生成連鎖球菌が入っている。

ケフィア菌微生物叢にはまた、βバクテリア及びストレプトバクテリア型の中温性乳酸桿菌が属しているが、それらの量は製造されたばかりのスターター中には多くない。

微生物叢組成中にはまた、ラクトースを発酵させる酵母及びそれを発酵しない酵母が入っている。ラクトース発酵酵母は製品の品質にとってより貴重であり、ケフィア中にこの酵母及び乳酸菌があると、抗生物質の蓄積がなされ、製品を治療に役立つものとするからである。

ケフィア菌微生物叢の組成に入る酢酸菌は、その典型的な代表であるアセトバクテルアセチ(Acetobacteraceti)と異なって、鞭毛を表面全体に有し、エネルギー物質として乳酸を利用する能力をもっている。これらのバクテリアがケフィア菌微生物叢の組成に存在すると、ケフィ

ア・スターターの活性の保持にまた製品のボディ及び味に影響を与える。

ケフィア菌の常住微生物叢にはまた、好熱性乳酸桿菌が入っている。

上述の微生物はみな、製造される製品の品質形成に主要な役割を演じている。

ケフィア・スターター1ml中の主な微生物叢群の細胞数の例を示すと下記のようなのである。

ホモ発酵中温性乳酸連鎖球菌……数十億または数億

ホモ発酵好熱性乳酸桿菌 …… 数十万

芳香生成菌 …… 数千万～数億

酵母 …… 数十万

酢酸菌 …… 数万～数十万

また、ケフィアが明瞭な味と香り及び良好なボディを有するとき、その1ml中の主要微生物叢群の平均含有量は下記のとおりである。

ホモ発酵中温性連鎖球菌 …… 数十億または数億細胞

ホモ発酵好熱性乳酸桿菌 …… 数百万細胞

芳香生成菌 …… 数千万～数億細胞

酵母 …… 数十万細胞

酢酸菌 …… 数千～数万細胞

ケフィア1g当りの乳酸菌数測定結果を下記第1表に示したが、MRS寒天培地にて25℃7日間培養した値が最も高く、1g当り $1.6 \times 10^7$ であった。

(本頁以下余白)

## 特開昭62-83842(3)

第 1 表

| 使用培地           | 培養条件       | 乳酸菌数/g            |
|----------------|------------|-------------------|
| BL 寒 天         | 好気・37℃72時間 | 1,000以下           |
|                | 嫌気・37℃72時間 | 1,000以下           |
|                | 好気・30℃48時間 | 1,000以下           |
|                | 好気・25℃7日間  | 1,000以下           |
| MRS 寒 天        | 好気・37℃72時間 | 1,000以下           |
|                | 嫌気・37℃72時間 | 1,000以下           |
|                | 好気・30℃48時間 | 1,000以下           |
|                | 好気・25℃7日間  | $1.6 \times 10^7$ |
| BCP加プレートカウント寒天 | 好気・37℃72時間 | 1,000以下           |
| トマトジュース寒天      | 好気・37℃72時間 | 1,000以下           |
|                | 嫌気・37℃72時間 | 1,000以下           |
| 脱脂乳寒天          | 好気・30℃48時間 | 1,000以下           |
| Elliker寒天      | 好気・25℃7日間  | $1.6 \times 10^6$ |
| グルコース・酵母エキス寒天  | 好気・25℃7日間  | $6.0 \times 10^6$ |
| SI 寒 天         | 好気・25℃20日間 | $2.2 \times 10^6$ |

MRS寒天（分離菌a,b）、Elliker寒天（分離菌c）、グルコース・酵母エキス寒天（分離菌d）およびSI寒天（分離菌e）平板より、それぞれ1～2個の集落を釣菌し、分離菌とした後、性状試験を行ったところ、分離菌はすべてヘテロ型の乳酸菌桿菌であった。分離菌a、b、dおよびeはラクトバシルス・ブレビス（*Lactobacillus brevis*）と同定された。ただし、分離菌a、b、およびdについてはアラビノースあるいはマルトースの発酵性に典型的な性状とは異なる点が認められた。また、分離菌cについては、リボースの発酵性が陰性ではあったが、他の性状より、ラクトバシルス・ブレビスの類縁菌と思われる。性状試験結果を第2表に示す。

なお、ケフィア菌株は、工業技術院微生物工業技術研究所に昭和60年10月7日に寄託したが、技術的理由によって不受理となった。

（本頁以下余白）

第 2 表

| 試験項目          | 試験結果  |       |       |       |       |
|---------------|-------|-------|-------|-------|-------|
|               | 分離菌 a | 分離菌 b | 分離菌 c | 分離菌 d | 分離菌 e |
| 形 態 *         | 桿 菌   | 桿 菌   | 桿 菌   | 桿 菌   | 桿 菌   |
| グラム染色         | 陽 性   | 陽 性   | 陽 性   | 陽 性   | 陽 性   |
| カタラーゼ         | —     | —     | —     | —     | —     |
| 生成乳酸          | DL    | DL    | DL    | DL    | DL    |
| 15℃での生育       | +     | +     | +     | +     | +     |
| 45℃での生育       | —     | —     | —     | —     | —     |
| グルコースよりガスの産生  | +     | +     | +     | +     | +     |
| グルコネートよりガスの産生 | +     | +     | +     | +     | +     |
| 糖の発酵性         |       |       |       |       |       |
| アミグタリン        | —     | —     | —     | —     | —     |
| アラビノース        | —     | —     | —     | —     | +     |
| セロビオース        | —     | —     | —     | —     | —     |
| フラクトース        | +     | +     | +     | +     | +     |
| グルコース         | +     | +     | +     | +     | +     |
| グルコネート        | +     | +     | +     | +     | +     |
| ラクトース         | +     | +     | +     | +     | +     |
| マルトース         | +     | +     | +     | —     | +     |
| マンニトール        | —     | —     | —     | +     | +     |
| マンノース         | —     | —     | —     | —     | —     |
| メルジトース        | —     | —     | —     | —     | —     |
| メリビオース        | +     | +     | +     | +     | +     |
| ラフィノース        | —     | —     | —     | —     | —     |
| ラムノース         | —     | —     | —     | —     | —     |
| リボース          | +     | 弱     | —     | +     | +     |
| ソルビトール        | —     | —     | —     | —     | —     |
| サクロース         | —     | —     | —     | —     | —     |
| トレハロース        | —     | —     | —     | —     | —     |
| キシロース         | —     | —     | —     | —     | —     |
| エクスリン         | —     | —     | —     | —     | —     |

次に本発明の凍結乾燥ヨーグルトの製造方法について述べる。

まず、ケフィア粒を活性化する。

ケフィア粒は小豆大～小指頭大、白色、カリフラワー状の種菌で、その構成菌は休眠状態にある。

そこで構成菌が培地内で活動し、一定時間内に一定の細菌叢を作り出すように活性化する必要がある。

活性化の方法は、通常では牛乳中でケフィア粒を20～25℃で培養し、数回継代することにより達成される。

活性化の具体的1例を下記に示す。

培地……UHT殺菌牛乳(130℃2秒殺菌)

培養の温度と時間……21℃、24時間培養

ケフィア粒の保存状態による前処理と培地量に対する添加量。

凍結乾燥ケフィア粒の場合は、滅菌水または滅菌生理食塩水に約6時間浸漬後洗浄し、培地に対して、約7.5重量%添加する。

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また、水漬けケフィア粒の場合は、生理食塩水で洗浄し、培地に対して約7.5重量%添加する。

2回目以後の継代は両者とも同じで、培地に対して約7.5重量%のケフィア粒を添加する。約20時間で牛乳を凝固させるようになれば、活性化していると、判断される。

活性化に要する日数は凍結乾燥ケフィア粒で10日以上、水漬けケフィア粒で4～5日である。

次に活性化したケフィア粒からケフィア・スターターを調製する。

すなわち、活性化したケフィア粒を生乳30～50に対し粒1の割合で（すなわち、乳1ℓあたり粒20～30g）入れ、培養する。培養温度は通常では15～25℃であり、好ましくは夏期で15～20℃、冬期で18～22℃である。粒を乳へ入れてから15～16時間培養後に3～4分間攪拌し、その温度でさらに5～7時間培養後再度攪拌し、きれいな容器へふるいで濾過する。

ふるい下として得られた濾過液はケフィア・

スターターであり、pHは4.0～4.6の範囲にある。ふるい上に残った粒は再び、新鮮な滅菌冷却した乳へ入れ、粒を濾過して得られた液（ケフィア・スターター）をケフィア製造に使用する。

このようにしてスターター調製の全過程には通常の24時間を要する。

次に得られたスターターを用いて発酵乳・ケフィアを製造する。原料には生乳あるいは必要に応じて乳製品を添加したものをを用いる。生乳に乳製品を添加する場合は、たとえば粉乳または練乳などを用いる。混合比率は、通常では生乳100重量部に対して乳製品2～10重量部である。

次に、この混合物をよく攪拌しながら60～70℃に加熱し、更に均質化处理を行なう。

この均質化处理は、発酵中あるいは後述する乾燥前に脂肪が分離しないようにするためであり、一般には100～150 kg/cm<sup>2</sup>に加圧することにより行なわれる。

更に加圧下後に85～95℃に加熱して殺菌する。この加熱時間は5～30分で良い。

殺菌後に使用するスターターの調製温度と同じ温度（15～25℃）に冷却し、攪拌しながら、前記スターターを接種する。

スターター接種量は、殺菌後の原料100重量部に対して、スターター3～5重量部である。

スターター接種後は、使用したスターターの調製温度と同じ温度で時々攪拌しながら培養する。

この培養過程においては、ヨーグルトに代表される乳酸発酵単独型と異なり、乳酸およびアルコール発酵の2つのプロセスが平行して起きる。

この培養は通常12～24時間で終了する。

培養終了後に10～15℃に冷却し、この温度で5～20時間、攪拌しながら熟成させる。

熟成終了後は、2～5℃に冷却して、発酵を停止させる。

得られた発酵乳・ケフィアの性状の一例を下

記第3表に示す。

第 3 表

配 合：

|            |         |
|------------|---------|
| 牛 乳        | 9 2.4 % |
| 乳製品        | 2.9 %   |
| ケフィールスターター | 4.7 %   |

栄養成分：

|       |          |
|-------|----------|
| エネルギー | 6 8 Kcal |
| 水 分   | 8 6.1 g  |
| 蛋白質   | 3.9 g    |
| 脂 質   | 3.2 g    |
| 糖 質   | 5.9 g    |
| 繊維質   | 0.0 g    |
| 灰 分   | 0.9 g    |
| カルシウム | 1 2 9 mg |
| リ ン   | 1 1 6 mg |
| 鉄     | 0.1 mg   |
| ナトリウム | 6 5 mg   |
| カリウム  | 1 9 9 mg |
| レチノール | 2 9 ug   |

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|       |         |
|-------|---------|
| カロチン  | 11 ug   |
| A効力   | 111 IU  |
| V-B1  | 0.05 mg |
| V-B2  | 0.19 mg |
| ナイアシン | 0.1 mg  |
| V-C   | 0 mg    |

このようにして得られた発酵乳ケフィアを容器たとえばトレイに収容し、-25~-35℃に冷却して凍結させる。

この凍結によって乳白色状の凍結物が得られる。

得られた凍結物を35~40℃以下に押え、真空度0.1~1.0mmHgで凍結乾燥する。

得られた凍結乾燥ヨーグルトは、白色乳白色の粉体状で、乳状の芳香を有している。

得られた凍結乾燥ヨーグルトの成分組成の一例を第4表に示す。

(本頁以下余白)

表 第 4

| 分析試験項目                                 | 結 果                    | 検出限界   | 注 | 分 析 方 法                |
|----------------------------------------|------------------------|--------|---|------------------------|
| 水分                                     | 1.7%                   |        | 1 | 減圧加熱乾燥法                |
| たんぱく質                                  | 26.3%                  |        |   | ケルダール法                 |
| 脂 質                                    | 27.4%                  |        |   | レーゼゴットリープ法             |
| 糖 類                                    | 0%                     |        |   | ヘンネルベルグストーマン改良法        |
| 灰 分                                    | 6.0%                   |        |   | 直接灰化法                  |
| ヒ素(As <sub>2</sub> O <sub>3</sub> として) | 38.6%                  | 0.1ppm | 2 | DOTC-Ag吸光度法            |
| 重金属(Pbとして)                             | 検出せず                   | 1 ppm  | 3 | 硫化ナトリウム比色法             |
| 大腸菌群                                   | 検出せず                   |        |   | BGLB法                  |
| 一般細菌数(生菌数)                             | 300以下/g                |        | 4 | メチチン・アグロース(10%)寒天平板培養法 |
| 乳酸菌数(除く)                               | 3.7×10 <sup>3</sup> /g |        | 5 | BCP加プレート寒天平板培養法        |
| 酵母数                                    | 2.8×10 <sup>3</sup> /g |        | 6 | BL寒天平板嫌気培養法            |
| 乳酸菌数                                   | 8.2×10 <sup>3</sup> /g |        |   |                        |

注 1. 窒素・たんぱく質換算係数: 6.38  
注 2. 100 - (水分+たんぱく質+脂質+繊維+灰分)  
注 3. 食品衛生検査指針 I 大腸菌群検査法に準じて試験した。  
注 4. 食品、添加物等の規格基準の第 1 食品 D 各条 O 粉末清涼飲料の乳酸菌を加えた粉末清涼飲料の細菌数の測定法 (昭和 34 年厚生省告示第 370 号) による。  
注 5. 乳及び乳製品の成分規格等に関する省令の別表の二の (七) 乳等の成分規格の試験法 (昭和 54 年厚生省令第 17 号) による。  
注 6. 培養条件: 25℃ 7 日間

#### (発明の効果)

本発明の凍結乾燥ヨーグルトは、白色粉末状であり、取扱いが容易であると共に、長期間、安定に室温に保存することができる。

また、容易に顆粒状に加工することもでき、かつ乳状の芳香を有するので摂取が容易である。

従って本発明の凍結乾燥ヨーグルトは、たとえば適量に分割、包装した状態で健康食品として商品化することができる。

従来の凍結乾燥前のケフィアに見られたような、保存中に発生したCO<sub>2</sub>による容器内圧の上昇は全く見られない。

更に注目すべきことは本発明の凍結乾燥ヨーグルトは、下記するような優れた生理活性効果を有する。

#### イ. 抗腫瘍活性

##### (実験方法)

癌細胞: エーリッヒ・カルシノーマ

使用動物: JCL-ICR マウス (♀, 5W, 20-23g)

癌の植えつけ: エーリッヒ・カルシノーマ

(5×10<sup>6</sup> セル/マウス) を右足筋肉内に移植 (固形)

検体の投与: 癌移植翌日より10日間連日1日1回経口投与した。

効果の判定: 移植処置より20日めに右足 (癌) の重さを測定し、左足 (コントロール) の重さを差し引いて癌化の指標とした。

又、抑制率(IR: Inhibition rate)は、検体投与群の平均癌重量(T)と対照群(水のみ投与群)の平均癌重量(C)とを用いて次の式により算出した。

$$IR = (1 - T/C) \times 100\%$$

なお判定は

- : 全く抑制しないか、抑制率(IR)

が、25%以下のもの

± : 25~50%のIRを示すもの

+ : 50%以上の抑制を示すもの

実験結果を下記第5表に示す。

第5表から明らかなように、本発明の凍結乾燥ヨーグルトは、500mg/kgと100mg/kgの投

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与量において最も強い抗腫瘍性が認められる。  
(本頁以下余白)

第 5 表

| Drug    | 投与 | Medication      |                    | Average<br>Tumor Wt.(g)<br>± SE | 抑制率<br>(%) | 評 価 |
|---------|----|-----------------|--------------------|---------------------------------|------------|-----|
|         |    | Dose<br>(mg/kg) | Schedule<br>(days) |                                 |            |     |
| ケファイール  | 経口 | 500             | 1~10               | 1.69±0.34                       | 52.8       | +   |
|         | 経口 | 100             | 1~10               | 1.66±0.19                       | 53.6       | +   |
|         | 経口 | 20              | 1~10               | 2.16±0.07                       | 39.7       | +   |
| マイトマイシン | 腹腔 | 1               | 1~10               | 1.53±0.19                       | 57.3       | +   |
| コントロール  | 経口 | —               | 1~10               | 3.58±0.78                       | —          | —   |

次に比較のために、現在市販されているヨーグルトについて、500mg/kgと100mg/kgを夫々上記同様に経口投与し、抑制率を算出した。結果を第6表に示す。

第 6 表

| メーカー | 抑制率(%) |
|------|--------|
| A 社  | 20.5   |
| B 社  | 15     |
| C 社  | 25     |
| D 社  | 15     |

第6表から明らかなように、市販ヨーグルトのいずれにも、抗腫瘍活性は殆んど認められない。

#### ロ、抗血栓症作用

##### (方 法)

ウイスター系ラットにケファイア500mg/kg、200mg/kgを経口投与1時間後にエンドトキシン0.5 mg/kg(血栓誘発剤)を静注し、4時

間後に採血し、血小板数、フィブリノーゲン量、プロトロンビン時間、フィブリン分解産物量を測定した。

##### (結 果)

第6表に示すように、正常群にエンドトキシンを静注すると、血栓が形成され、血小板数、フィブリノーゲン量が減少し、プロトロンビン時間が延長し、FDP量が増加した。本発明の凍結乾燥ヨーグルト投与群は有意に血液検査値の変動を抑制した。すなわち、200-500mg/kgの投与量で顕著な抗血栓症作用が認められた。実験結果を第7表に示す。

(本頁以下余白)

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第 7 表

| 治 療           | 投 与 量<br>(mg/kg) | No of rats | 血小板数<br>( $10^4/\text{mm}^3$ ) | フリマン量<br>(mg/dl) | 加算時間<br>(sec)   | フリマン分解産物<br>( $\mu\text{g/dl}$ ) |
|---------------|------------------|------------|--------------------------------|------------------|-----------------|----------------------------------|
| Normal        |                  | 6          | 85 $\pm$ 10                    | 151 $\pm$ 34     | 14.4 $\pm$ 2.6  | 5.0 $\pm$ 0.0                    |
| コントロール        |                  | 9          | 27 $\pm$ 3                     | 44 $\pm$ 5       | 23.9 $\pm$ 2.0  | 19.0 $\pm$ 3.1                   |
| 本発明の凍結乾燥ヨーグルト | 200              | 9          | 35 $\pm$ 3*                    | 62 $\pm$ 10*     | 17.0 $\pm$ 1.6  | 15.0 $\pm$ 3.8                   |
| 同上            | 500              | 9          | 56 $\pm$ 8**                   | 85 $\pm$ 17**    | 15.0 $\pm$ 1.6* | 14.0 $\pm$ 4.6                   |

Significantly different from control, \*p&lt;0.05, \*\*p&lt;0.01

## ハ. 生体防御機構に関する検討

(初期免疫賦活効果について)

生体は、外界より異物の侵入を受けると、いち早く排除しようと初期免疫機構が、活動する。その主役はマクロファージや細網内皮系の細胞群である。今回は、異物としてカーボンを血中へ侵入させ、その後の異物排除の能力を、血中からのカーボン消失速度を指標に把握した。この実験系は、生体防御反応を検討する際によく利用される系でフリードマン(Freedman)らによって開発されたカーボンクリアランス法である。

## (実験方法)

ddy 系雄性マウス(体重20~25g)を18時間絶食ケージにて絶食し(水は自由採取)、尾静脈よりカーボン浮遊液を注入しヘパリンヘマトクリット毛細管を用いて採血し、675nmにおける吸光度から含有カーボン量を比色定量し、次式によりカーボン半減消失時間を求めた。

$$t_{1/2} = \frac{(t_2 - t_1) \times 1/2 \text{ } 0 \text{ } D t_1}{0 \text{ } D t_1 - 0 \text{ } D t_2}$$

 $t_{1/2}$  = 半減消失時間 (分) $t_1$  = 5 (分) $t_2$  = 10または15 (分) $0 \text{ } D t_1$  = 5分後の吸光度 $0 \text{ } D t_2$  = 10または15分後の吸光度

なお検体は、500mg/kg 100mg/kg 20mg/kg

の用量に調製し(水にけん濁)、陽性コントロールにチモザン50mg/kg(i.p.)を用いて3日間、あるいはカーボン静注30分前に経口投与した。

実験結果を下記第8表に示す。

第 8 表

## (A) 1回投与の場合

| 検体            | 投与量<br>(mg/kg) | No of mouse | Clearance rate<br>of Carbon |
|---------------|----------------|-------------|-----------------------------|
| コントロール        | — (経口)         | 10          | 11.83 $\pm$ 0.37            |
| 本発明の凍結乾燥ヨーグルト | 500(経口)        | 10          | 11.32 $\pm$ 0.29            |
| 同 上           | 100(経口)        | 10          | 11.73 $\pm$ 0.42            |

|      |          |    |                  |
|------|----------|----|------------------|
| 同 上  | 20(経口)   | 10 | 10.99 $\pm$ 0.42 |
| チモザン | 50(i.p.) | 10 | 10.72 $\pm$ 0.29 |

## (B) 3日投与の場合(1日1回)

| 検体            | 投与量<br>(mg/kg) | No of mouse | Clearance rate<br>of Carbon |
|---------------|----------------|-------------|-----------------------------|
| コントロール        | — (経口)         | 10          | 12.84 $\pm$ 0.57            |
| 本発明の凍結乾燥ヨーグルト | 500(経口)        | 10          | 10.70 $\pm$ 0.56            |
| 同 上           | 100(経口)        | 10          | 11.41 $\pm$ 0.52            |
| 同 上           | 20(経口)         | 10          | 12.28 $\pm$ 0.63            |
| チモザン          | 50(i.p.)       | 10          | 8.31 $\pm$ 0.34*            |

\* コントロールとの比較: P < 0.05で有意差あり

第8表から明らかなように、本発明の凍結乾燥ヨーグルトは、1回投与では20mg/kgに弱い活性がみられたただであったが、3日間投与すると500mg/kgと100mg/kgに有意な活性が見い出された。

以下、本発明の実施例を示す。

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(実施例)

生乳17kgを140℃で2秒殺菌した後、21℃に冷却し、これに活性化したケフィア粒0.6kgを接種し、21℃で15時間培養した。

3～4分間攪拌し、21℃で更に培養し、再度攪拌した後に、ふるいで濾過し、ふるい下として得られた培養濾液17kgをケフィア・スターターとして用いた。

ふるい上には活性化ケフィア粒1.2kgが残った。

一方、脱脂粉乳10kgと生乳323kgを混合し、よく攪拌しながら70℃に加熱し、150kg/cm<sup>2</sup>に加圧して均質化処理した。次いで90℃で10分間殺菌した後21℃に冷却し、攪拌しながら上記ケフィア・スターター17kgを接種し、21℃で時々攪拌しながら15時間、培養した。15℃に冷却し、この温度で5時間熟成させ、5℃に冷却して350kgのケフィアを得た。

このケフィアをトレイに分割して積載し、-25～-35℃に冷却して凍結させた。

得られた凍結物を35～40℃で0.1～1.0mmHgで乾燥し、本発明の凍結乾燥ヨーグルト49kgを得た。

|     |     |    |    |
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**United States Patent** [19]  
**Tokumaru et al.**

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[54] **LYOPHILIZED KEFIR YOGHURT HEALTH FOOD**

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[57] **ABSTRACT**

A lyophilized kefir yoghurt health food is disclosed.

The lyophilized kefir yoghurt is a fermentation product obtained from milk with the use of kefir fungi and in the form of a lyophilized powder.

This lyophilized kefir yoghurt is produced by inoculating milk with a kefir starter, which is then cultured therein to thereby produce a yoghurt; and lyophilizing the obtained yoghurt.

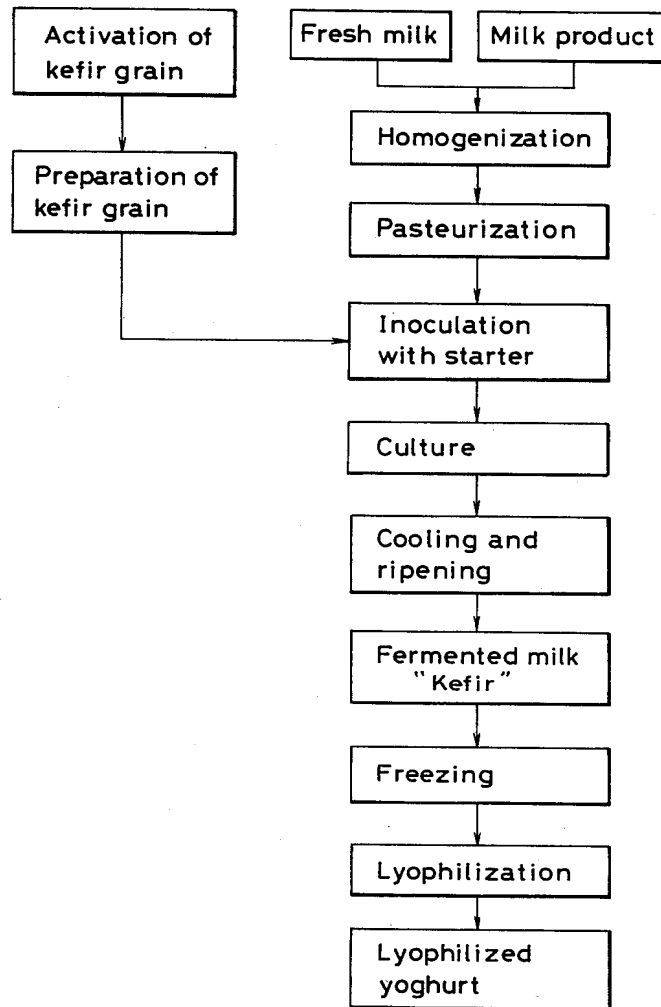
The health food contains lyophilized kefir yoghurt as a main component.

**5 Claims, 1 Drawing Figure**

U.S. Patent

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**LYOPHILIZED KEFIR YOGHURT HEALTH FOOD****BACKGROUND**

This invention relates to a lyophilized kefir yoghurt, a process for the production of the same and a health food containing the same as a main ingredient.

It has been known in the art that 37 kefir<sup>®</sup>, which is a fermented milk originating in Caucasus, has been habitually taken in the Soviet Union and Eastern Europe. Recently the kefir has been rapidly attracting public attention since fermented milk is recognized as an excellent health food and Caucasus is world-famous for longevity.

However, examinations on the kefir, which is different from single-type lactic fermented milk such as yoghurt, are yet insufficient in spite of the recent increase in the attention thereto.

Kefir would form CO<sub>2</sub> as ripening is prolonged to thereby elevate the internal pressure of a container, which is an obstacle to the marketing of the same.

On the other hand, there are marketed various health foods riding the crest of the recent health food boom.

However many of these health foods contain vegetable or animal components as active ingredients and there are few solid health foods containing fermented milk as an active ingredient.

**SUMMARY**

It is a first object of the present invention to provide a powdery lyophilized kefir yoghurt, which will be sometimes called merely a lyophilized yoghurt hereinafter, obtained by lyophilizing kefir.

It is a second object of the present invention to provide a process for the production of the lyophilized kefir yoghurt.

Further it is a third object of the present invention to provide a health food containing the lyophilized kefir yoghurt as a main active ingredient.

The first object of the present invention as described above can be achieved by a powdery lyophilized kefir yoghurt which is prepared by lyophilizing a fermentation product obtained from milk with the use of kefir fungi.

The second object of the present invention can be achieved by inoculating milk with a kefir fungi starter, culturing the kefir fungi therein to thereby produce yoghurt and lyophilizing the obtained yoghurt.

Further the third object of the present invention can be achieved by a health food comprising the lyophilized yoghurt, assistants and excipients.

**THE DRAWINGS**

The sole appended FIGURE is a flow diagram of a process for the production of the lyophilized yoghurt of the present invention.

**THE PREFERRED EMBODIMENTS**

The lyophilized kefir yoghurt of the present invention is a fermentation product obtained from milk with the use of kefir fungi and in the form of a lyophilized powder. This lyophilized yoghurt may be produced by inoculating milk with a kefir fungi starter to thereby produce yoghurt which is then lyophilized.

The kefir fungi as described above, which have been obtained from Licensing Organization USSR by us and called YK-1, are a natural symbion which comprises

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various microorganisms and behaves as a single organism from a biological viewpoint. The kefir fungi are generally in the form of a white cauliflower as large as from an adzuki bean to the head of a little finger and supplied as lyophilized or water-immersed kefir grains.

It is generally very difficult to directly examine the organized bacteria of these grains since the organized bacteria therein are in the dormant state and form a rigid structure together with polysaccharides and proteins.

Thus the organized bacteria of the grains are assumed by culturing the grains in an appropriate medium such as milk at 20° to 25° C. to thereby activate the same and examining the microbes liberated in the medium. The following Table 1 shows the organized bacteria.

**TABLE 1**

| Yeast                                                                                            |                                      |
|--------------------------------------------------------------------------------------------------|--------------------------------------|
| <i>Candida pseudotropicalis</i>                                                                  | 10 <sup>5</sup> -10 <sup>6</sup> /ml |
| <i>Candida Krusei</i>                                                                            | <10 <sup>5</sup> /ml                 |
| <i>Torulopsis holmii</i>                                                                         | <10 <sup>5</sup> /ml                 |
| Lactic acid bacteria                                                                             |                                      |
| <i>Streptococcus lactis</i>                                                                      | 10 <sup>8</sup> -10 <sup>9</sup> /ml |
| <i>Lactobacillus brevis</i>                                                                      |                                      |
| <i>Lactobacillus fermentum</i>                                                                   |                                      |
| Several species, which are highly symbiotical and can be hardly separated, are further observed. |                                      |
| Acetic acid bacteria                                                                             |                                      |
| Highly symbiotical and hardly separated.                                                         |                                      |

As shown above, *S. lactis* is the most predominant bacterium and the lactic acid in the medium is mostly produced thereby. Among the yeasts, only *C. pseudotropicalis* ferments lactose to thereby form ethanol and CO<sub>2</sub>.

Now a process for the production of a lyophilized yoghurt will be described by reference to the appended FIGURE.

In the present invention, the kefir grains as described above are first activated. Since the organized bacteria in the kefir grains are in the dormant state, it is required to activate the same to thereby make them sufficiently active in a medium to make a definite number of colonies within a given period of time.

The activation may be usually achieved by subculturing the kefir grains several times, i.e., by culturing the kefir grains in milk at 20° to 25° C., separating the grains and culturing the same again.

An example of the activation process is as follows: medium: UHT pasteurized milk (pasteurized at 130° C. for two seconds); and culture condition: 21° C. and 24 hours.

The kefir grains are subjected to a pretreatment and added to a medium depending on the storage condition.

Lyophilized kefir grains are immersed in sterilized water or a sterilized physiological saline solution for approximately six hours and washed. Then they are added to a medium in an amount of approximately 7.5% by weight based on the medium.

Water-immersed kefir grains are washed with a physiological saline solution and added to a medium in an amount of approximately 7.5% by weight based on the medium.

Both kefir grains are treated in the same manner after the second subculture. Namely, approximately 7.5% by weight of the kefir grains are added to a medium. The

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kefir grains capable of coagulating milk in about 20 hours are judged to be activated.

The activation of lyophilized kefir grains and water-immersed ones requires 10 days or longer and four to five days, respectively.

Then a kefir starter is prepared from the kefir grains thus activated.

Namely, one part by weight of the activated kefir grains are added to 30 to 50 parts by weight of fresh milk, i.e., 20 to 30 g of the grains per liter of the milk, and cultured therein. The culture may be usually performed at 15° to 25° C., preferably at 15 to 20° C. in summer and 18° to 22° C. in winter. After culturing the grains in the milk for 15 to 16 hours, the culturing broth is stirred for three or four minutes. The culture is performed for additional five to seven hours followed by stirring again. Then the culturing broth is filtered into a clean container.

The obtained filtrate, which has a pH value of 4.0 to 4.6, is the aimed kefir starter. The grains on the filter is introduced into fresh pasteurized cold milk again. The solution obtained by filtering the grains off, i.e., the kefir starter is used in the production of kefir.

Thus the whole process for the preparation of the starter usually required 24 hours.

Table 2 shows the organized bacteria of the kefir starter.

TABLE 2

|                                                          |
|----------------------------------------------------------|
| Homofermentation mesophilic lactic acid streptococci (a) |
| Homofermentation thermophilic lactic acid bacilli        |
| Perfume forming bacteria                                 |
| Yeasts (b)                                               |
| Acetic acid bacterium (c)                                |

The streptococci (a) include perfume forming streptococci which rapidly elevate the acidity of the starter, e.g., *Streptococcus lactis*, *S. cremoris*, *Louconostoc citrovorum*, *L. dextranicum* and *S. diacetylactis*.

The yeasts (b) include those fermenting lactose as well as those not fermenting the same. The acetic acid bacterium (c) has flagellums all over the surface and is capable of utilizing lactic acid as an energetic material, different from *Acetobacter aceti*.

Then a fermented milk 37 kefir" is produced with the use of the starter. Fresh milk optionally containing milk product(s) is employed as the raw material. The milk products to be added to the fresh milk are powdered or condensed milk. Usually two to ten parts by weight of the milk products are added to 100 parts by weight of the fresh milk.

Then the mixture is heated to 60° to 70° C. under thoroughly stirring and subjected to further homogenization.

This homogenization is carried out in order to prevent the separation of fat during the fermentation or before the drying, as will be described hereinbelow. It is generally performed by applying a pressure of 100 to 150 kg/cm<sup>2</sup> and passing the mixture through, for example, a screen. After applying the pressure, the mixture is pasteurized by heating the same to 85° to 95° C. for five to 30 minutes.

After the pasteurization, the mixture is cooled to the same temperature (15° to 25° C.) as that of the starter to be used and inoculated with said starter under stirring.

100 parts by weight of the pasteurized material is inoculated with three to five parts by weight of the starter.

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After inoculating with the starter, the material is cultured at the same temperature as that of the starter used under occasional stirring.

During this culture step, two processes, i.e., lactic fermentation and alcohol fermentation, proceed in parallel with each other, different from single-type lactic fermentation as typically observed in the production of yoghurt.

The culture usually completes within 12 to 24 hours. After the completion of the culture, the mixture is cooled to 10° to 15° C. and allowed to ripen at this temperature for five to 20 hours.

After the completion of the ripening, it is cooled to 2° to 5° C. to thereby cease the fermentation.

Table 3 shows the properties of the fermented milk 37 kefir" thus obtained.

Table 4 shows the result of the counting of the lactic acid bacteria per gram of the kefir. Table 4 indicates that a sample obtained by culturing the material in an MRS agar medium at 25° C. for seven days shows the largest count, i.e.,  $1.6 \times 10^7$ /g.

TABLE 3

| Composition                         |         |
|-------------------------------------|---------|
| milk                                | 92.4%   |
| milk products                       | 2.9%    |
| kefir starter                       | 4.7%    |
| Nutritional components (per 100 g): |         |
| energy                              | 68 Kcal |
| water                               | 86.1 g  |
| protein                             | 3.9 g   |
| lipid                               | 3.2 g   |
| sugar                               | 5.9 g   |
| fiber                               | 0.0 g   |
| ash                                 | 0.9 g   |
| calcium                             | 129 mg  |
| phosphorus                          | 116 mg  |
| iron                                | 0.1 mg  |
| sodium                              | 65 mg   |
| potassium                           | 199 mg  |
| retinol                             | 29 ug   |
| carotene                            | 11 ug   |
| A activity                          | 111 IU  |
| vitamin B1                          | 0.05 mg |
| vitamin B2                          | 0.19 mg |
| niacin                              | 0.1 mg  |
| vitamin C                           | 0 mg    |

TABLE 4

| Medium                          | Culture condition        | Lactic acid bacteria count (/g) |
|---------------------------------|--------------------------|---------------------------------|
| BL agar                         | aerobic, 37° C., 72 hr   | <1,000                          |
|                                 | anaerobic, 37° C., 72 hr | <1,000                          |
|                                 | aerobic, 30° C., 48 hr   | <1,000                          |
|                                 | aerobic, 25° C., 7 days  | <1,000                          |
| MRS agar                        | aerobic, 37° C., 72 hr   | <1,000                          |
|                                 | anaerobic, 37° C., 72 hr | <1,000                          |
|                                 | aerobic, 30° C., 48 hr   | <1,000                          |
|                                 | aerobic, 25° C., 7 days  | $1.6 \times 10^7$               |
| BCP containing plate count agar | aerobic, 37° C., 72 hr   | <1,000                          |
|                                 | anaerobic, 37° C., 72 hr | <1,000                          |
|                                 | aerobic, 30° C., 48 hr   | <1,000                          |
|                                 | aerobic, 25° C., 7 days  | $1.6 \times 10^6$               |
| glucose/yeast extract agar      | aerobic, 25° C., 7 days  | $6.0 \times 10^6$               |
|                                 | aerobic, 25° C., 20 days | $2.2 \times 10^6$               |

Bacteria are taken from one or two colonies on each of the MRS agar (separated bacteria a and b), Elliker agar (separated bacterium c), glucose/yeast extract agar (separated bacterium d) and SI agar (separated bacte-

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rium e) media. Then the characteristics of the separated bacteria are examined. As a result, it is turned out that every separated bacterium is a hetero-type lactic acid bacillus.

The separated bacteria a, b, d and e are identified with *Lactobacillus brevis*. However the a, b and d show arabinose or maltose fermentabilities somewhat different from those typically observed. The properties of the separated bacterium c suggest that it might relate to *Lactobacillus brevis*, though it is negative in ribose fermentation. Table 5 shows the result of the characteristic test on these bacteria.

TABLE 5

| Test item            | Separated bacterium |           |           |           |           |
|----------------------|---------------------|-----------|-----------|-----------|-----------|
|                      | a                   | b         | c         | d         | e         |
| morphology           | ba-cillus           | ba-cillus | ba-cillus | ba-cillus | ba-cillus |
| gram-stain           | pos-itive           | pos-itive | pos-itive | pos-itive | pos-itive |
| catalase             | —                   | —         | —         | —         | —         |
| formed lactic acid   | DL                  | DL        | DL        | DL        | DL        |
| growth at 15° C.     | +                   | +         | +         | +         | +         |
| growth at 45° C.     | —                   | —         | —         | —         | —         |
| gas production       | +                   | +         | +         | +         | +         |
| from glucose         | +                   | +         | +         | +         | +         |
| from gluconate       | +                   | +         | +         | +         | +         |
| sugar fermentability |                     |           |           |           |           |
| amygdaline           | —                   | —         | —         | —         | —         |
| arabinose            | —                   | —         | —         | —         | +         |
| cellobiose           | —                   | —         | —         | —         | —         |
| fructose             | +                   | +         | +         | +         | +         |
| glucose              | +                   | +         | +         | +         | +         |
| gluconate            | +                   | +         | +         | +         | +         |
| lactose              | +                   | +         | +         | +         | +         |
| maltose              | +                   | +         | +         | +         | +         |
| mannitol             | —                   | —         | —         | +         | +         |
| mannose              | —                   | —         | —         | —         | —         |
| melezitose           | —                   | —         | —         | —         | —         |
| melibiose            | +                   | +         | +         | +         | +         |
| raffinose            | —                   | —         | —         | —         | —         |
| rhamnose             | —                   | —         | —         | —         | —         |
| ribose               | +                   | slight    | —         | +         | +         |
| sorbitol             | —                   | —         | —         | —         | —         |
| sucrose              | —                   | —         | —         | —         | —         |
| trehalose            | —                   | —         | —         | —         | —         |
| xylose               | —                   | —         | —         | —         | —         |

The fermented milk kefir thus obtained is introduced into a container such as a tray and cooled to -25° to -35° C. to thereby freeze the same.

Thus a milk white frozen product is obtained.

The obtained frozen product is maintained at a temperature of 35° to 40° C. or below and dried under a reduced pressure of 0.1 to 1.0 mm Hg.

The lyophilized yoghurt thus obtained is in the form of a white or milk white powder having a milk-like odor.

Table 6 shows the composition of the lyophilized yoghurt thus obtained.

The obtained lyophilized yoghurt of the present invention is in the form of a white powder which can be readily handled and stably stored at room temperature for a prolonged period of time.

Further it may be readily formulated into granules. In addition, the milk-like odor thereof makes the intake thereof easy.

Accordingly the lyophilized yoghurt of the present invention per se can be marketed as a health food by appropriately dividing and packaging.

The lyophilized yoghurt of the present invention shows no increase in the inner pressure within a con-

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tainer caused by the formation of CO<sub>2</sub>, which is observed in conventional unlyophilized kefir.

It is further noteworthy that the lyophilized yoghurt of the present invention has the following excellent physiological effects.

TABLE 6

| Analysis item                                | Result                   | Lower limits of detection | Note | Analytical method                        |
|----------------------------------------------|--------------------------|---------------------------|------|------------------------------------------|
| 10 water                                     | 1.7%                     |                           |      | heat-drying in vacuo                     |
| protein                                      | 26.3%                    |                           | 1    | Kjeldahl method                          |
| lipid                                        | 27.4%                    |                           |      | Rose-Gottlieb method                     |
| 15 fiber                                     | 0%                       |                           |      | modified Henneberg-Stohmann method       |
| ash                                          | 6.0%                     |                           |      | direct ashing                            |
| sugar                                        | 38.6%                    |                           |      |                                          |
| arsenic (as As <sub>2</sub> O <sub>3</sub> ) | undetected               | 0.1 ppm                   | 2    | DDTC-Ag absorptiometry                   |
| heavy metal (as Pb)                          | undetected               | 1 ppm                     |      | sodium sulfide colorimetric method       |
| 20 coliform bacilli                          | negative                 |                           | 3    | BGLB method                              |
| general viable bacterial count               | <300/g                   |                           | 4    |                                          |
| 25 except lactic acid bacteria               |                          |                           |      |                                          |
| yeast count                                  | 3.7 × 10 <sup>2</sup> /g |                           |      | potato dextrose (10%) agar plate culture |
| 30 lactic acid bacteria count                | 2.8 × 10 <sup>9</sup> /g |                           | 5    | BCP-containing agar plate culture        |
| lactic acid bacteria count                   | 8.2 × 10 <sup>9</sup> /g |                           | 6    | BL agar plate anaerobic culture          |

Notes:

1: nitrogen/protein coefficient = 6.38.

2: 100 - (water + protein + lipid + fiber + ash).

3: According to the Coliform Bacilli Test, Food Sanitation Guidance, Ministry of Health and Welfare.

4: According to the Bacterial Counting in Powdery Refreshing Beverage Containing Lactic Acid Bacteria, Provision Food-D: Standard for Food and Food additive (Notification No. 307 of the Ministry of Health and Welfare, 1959).

5: According to Test Method for Composition of Milk, Accompanying Table 2-(7) of Ministerial Ordinance on Specification for Milk and Milk Product (Notification No. 17 of the Ministry of Health and Welfare, 1979).

6: Cultured at 25° C. for seven days.

Now the health food of the present invention will be described in detail.

This health food comprises the lyophilized yoghurt as described above as well as assistants and excipients.

The assistants are added in order to impart to the product various physiological effects in addition to those brought about by the main ingredient, i.e., the lyophilized yoghurt to thereby enlarge the availability of the product as a health food. Animal or vegetable substances conventionally marketed as health foods or folk medicines are available therefor.

Preferable examples of these assistants include an extract of *Acanthopanax senticosus* Harms. (*Eleutherococcus senticosus* Maxim.), that of *Cichorium Intylois* L. and antlers of a reindeer, though they are not restricted thereby.

One of these assistants or a mixture thereof may be added.

The extract of *A. senticosus* Harms. may be replaced by that of ginseng or calcium L(+)-lactate.

The extract of *A. senticosus* Harms., which has been used to accelerate blood circulation for a long time, may be obtained in the following manner.

Roots and stems of *A. senticosus* Harms., which belongs to *Araliaceae* and mainly occurs in Siberia and North East China, are cut into pieces. 500 l of water is

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added to, for example, 100 kg of the finely divided product which is thus extracted for three hours at 90° to 100° C. After filtering, approximately 400 g of an extract is obtained.

To the extraction residue, 300 l of water is added again followed by extracting the same at 90° to 100° C. for one hour. After filtering, approximately 300 l of an extract is obtained.

These extracts are combined and concentrated to approximately 20 l at 60° C. or below in vacuo. The obtained concentrate is spray-dried and the dry product is passed through a screen to thereby give approximately 5 kg of a homogeneous powder.

A powder of reindeer antlers, which has been considered as a tonic, may be prepared by finely dividing reindeer antlers imported from Finland, further hammer-milling the same and filtering the same through a 100-mesh screen to give a homogeneous powder. A sterilization step may be optionally performed during the preparation.

The ginseng dried extract to be used in stead of the *A. senticosus* Harms. extract may be prepared by subjecting root of *Panax Ginseng* C. A. Meyer in a two-time repetition, concentrating the liquid extract under reduced pressure, and spray drying the concentrate. It may be added in the same amount as that of the *A. senticosus* Harms. as will be defined hereinbelow. Calcium L(+)-lactate may be prepared through a neutralizing reaction between fermented L(+) lactic acid and lime. It is added in an amount of 0.5 to 1% by weight of the total health food.

Further the *C. Intylous* L. extract, which has been used in immunoinvigation in Europe for a long time, may be prepared in the following manner.

Namely, leaves and roots of *Cichorium Intylous* L., which belongs to *Conpositae* and mainly occurs in Europe, are cut into pieces. 800 l of water is added to, for example, 100 kg of the finely divided product which is thus extracted at 90° to 100° C. for three hours. After filtering, approximately 700 l of an extract is obtained.

500 l of water is added to the extraction residue which is thus further extracted at 90° to 100° C. for one hour. After filtering, approximately 400 l of an extract is obtained.

These extracts are combined and concentrated to approximately 35 kg at 60° C. or below in vacuo to thereby give a soft syrup.

The excipients as used in the present invention include lactose and starch. One of these excipients or a mixture thereof may be employed.

In the health food of the present invention, the kefir, assistants and excipients are blended in the proportions as shown in the following Table 11.

TABLE 11

|                   |                                                             |
|-------------------|-------------------------------------------------------------|
| Lyophilized kefir | usually 30 to 50% by weight, preferably 35 to 45% by weight |
| Assistant         | usually 7 to 15% by weight, preferably 9 to 14% by weight   |
| Excipient         | usually 40 to 55% by weight, preferably 45 to 55% by weight |

Table 12 shows the composition of an example of the health food of the present invention which comprises an *A. senticosus* Harms. extract, a reindeer antler powder and a *C. Intylous* L. extract as the assistants and lactose and starch as the excipients.

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TABLE 12

|                                     |                                                                 |
|-------------------------------------|-----------------------------------------------------------------|
| Lyophilized kefir                   | usually 30 to 50% by weight, preferably 35 to 45% by weight     |
| <i>A. senticosus</i> Harms. extract | usually 1.5 to 4.0% by weight, preferably 2.0 to 3.5% by weight |
| Reindeer antler powder              | usually 0.3 to 1.0% by weight, preferably 0.4 to 0.8% by weight |
| <i>C. Intylous</i> L. extract       | usually 5.5 to 10% by weight, preferably 6.5 to 9.5% by weight  |
| Lactose                             | usually 30 to 38% by weight, preferably 32 to 37% by weight     |
| Starch                              | usually 10 to 18% by weight, preferably 12 to 17% by weight     |

When the reindeer antler powder is contained in an amount less than 0.3% by weight, it shows no tonic effect. On the other hand, when it is contained in an amount exceeding 1.0% by weight, no significant increase in said effect is observed.

When the lactose is contained in an amount less than 30% by weight, it shows a poor excipient property for formulating granules or tablets, as will be shown hereinbelow. On the other hand, an amount of the same exceeding 38% by weight is excessive for the lyophilized yoghurt or the assistants.

The starch would accelerate the dissolution of other ingredients taken in the body while at the same time it acts as an assistant and as an excipients. When it is contained in an amount less than 10% by weight, the bulking and excipient effect of the same is insufficient. On the other hand, when it is contained in an amount exceeding 18% by weight, no significant difference in said effects is observed.

The health food of the present invention may further contain sweeteners such as sugar, colorants and preservatives if required.

Now a process for the production of the health food of the present invention in granular form will be described.

The assistants and excipients as described above are weighed and mixed together. Then water and ethanol are added thereto and the obtained mixture is kneaded.

The kneaded mixture is passed through a screen of 1 mm in diameter and the particles thus obtained are dried at 60° to 80° C. for one hour. The dried particles are arranged by passing through a 12-mesh screen and further passed through a 12-mesh screen.

Separately a lyophilized kefir is prepared in the abovementioned manner and formulated into granules by, for example, the same procedure as the one used in the granulation of the assistants and excipients.

Finally the lyophilized kefir and other ingredients, each formulated in granules as described above, are weighed and mixed together to thereby give the health food of the present invention.

Further the presence of coliform bacilli and general viable bacteria therein is optionally examined.

In addition, the obtained health food may be weighed out in a given amount and singly packaged with, for example, a plastics film, if required. Thus a product suitable for marketing and intake may be obtained.

Thus a process for the production of the health food of the present invention in granular form has been described. However it is to be understood that the present invention is not restricted thereby. Therefore it may be formulated into tablets or provided as a powder by omitting the granulation step.

The health food of the present invention may be generally taken in a dose of 2.5 to 3.0 g a day. The singly

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packaged granules as mentioned above is preferable since it would not scatter at the intake.

Alternately the granules may be packed in a bottle and taken in a given amount with the use of, for example, a measuring spoon.

The health food of the present invention is in a grayish white or grayish brown color depending on the types and amounts of the added assistants and has a milk-like odor and taste. Thus it can be easily taken. Further it shows no change even when stored for a prolonged period of time.

As described above, the health food of the present invention contains the lyophilized kefir.

Furthermore, the health food of the present invention contains assistants in addition to the lyophilized yoghurt.

In addition, the health food of the present invention may be formulated into, for example, granules by adding excipients. Thus the milk-like odor and taste of the lyophilized kefir are maintained as such, which makes the intake of a given amount of the product easy.

To further illustrate the present invention, the following Examples will be given.

#### EXAMPLE 1

17 kg of fresh milk was pasteurized at 140° C. for two seconds and cooled to 21° C. Then the milk was inoculated with 0.6 kg of activated kefir grains which were thus cultured therein at 21° C. for 15 hours.

After stirring for three to four minutes, the culture was further performed at 21° C. After stirring again, the culture broth was filtered through a screen and 17 kg of the obtained culture filtrate was used as a kefir starter.

Thus 1.2 kg of the activated kefir grains remained on the screen.

Separately 10 kg of skim milk was mixed with 323 kg of fresh milk and the mixture was heated to 70° C. under thorough stirring. Then it was homogenized under an elevated pressure of 150 kg/cm<sup>2</sup>. After pasteurizing at 90° C. for ten minutes, it was cooled to 21° C. and inoculated with 17 kg of the above kefir starter under stirring followed by culturing at 21° C. under occasional stirring. Then the culture was cooled to 15° C. and allowed to ripen at this temperature for five hours. After cooling to 5° C., 350 kg of kefir was obtained.

The obtained kefir was divided, placed on a tray and frozen at -25° to -35° C.

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The frozen product was dried at 35° to 40° C. under a pressure of 0.1 to 1.0 mmHg to thereby give 49 kg of the lyophilized yoghurt of the present invention.

#### EXAMPLE 2

A health food of the composition as shown in the following Table 13 was produced.

TABLE 13

|                                     |            |
|-------------------------------------|------------|
| lyophilized kefir                   | 1000 mg    |
| <i>A. senticosus</i> Harms. extract | 81.90 mg   |
| reindeer antler powder              | 17.55 mg   |
| <i>C. Intylous</i> L. extract       | 234.00 mg  |
| lactose                             | 833.275 mg |
| starch                              | 333.275 mg |

Thus these ingredients in amounts as shown in Table 13 were thoroughly mixed together and the obtained mixture was granulated.

The granules thus obtained, which were in a pale brown color and showed a milk-like odor and flavor, were tasty and could be easily taken.

We claim:

1. A health food which comprises 30 to 50% by weight lyophilized kefir yoghurt, 7 to 15% by weight at least one ingredient selected from the group consisting of an extract of *Acanthopanax senticosus* Harms., an extract of *Cichorium Intylous* L. and a powder of reindeer antlers, and 40 to 55% by weight of at least one excipient.

2. A health food as set forth in claim 1, which comprises 35 to 45% by weight of the lyophilized kefir yoghurt, 9 to 14% by weight of the assistant(s) and 45 to 55% by weight of the excipient(s).

3. A health food as set forth in claim 1, wherein said lyophilized kefir yoghurt is a fermentation product obtained from milk and kefir fungi and wherein the kefir yogurt fermentation product is in the form of a lyophilized powder.

4. A health food as set forth in claim 1, wherein said excipients are selected from the group consisting of lactose and starch.

5. A health food as set forth in claim 2, which comprises 1.5 to 4.0% by weight of an extract of *A. senticosus* Harms., 0.3 to 1.0% by weight of a powder of reindeer antlers and 5.5 to 10% by weight of an extract of *C. Intylous* L.

\* \* \* \* \*

**SU291395**

**SUBJECT MATTER OF THE INVENTION**

1. A method for preparing a product capable of imparting a taste of meat, by mixing organic carboxylic acids with a liquid medium, characterized in that in order to impart the taste and aroma of fried meat, a sulfur-containing compound is introduced to the mixture, the sulfur-containing compound being selected from the group comprising 3-acetyl-3-mercaptopropanol-1 and thiamine, wherein the whole mixture is heated to initiate reaction.

2. The method according to claim 1, characterized in that the heating of the mixture is carried out at a temperature of from 180°F (82.2°C) to 350°F (176.7°C).

3. The method according to claims 1 and 2, characterized in that the pH of the medium during the reaction is maintained within a pH range of 3.5 to 7.0.

4. The method according to claims 1-3, characterized in that a nonsubstituted aliphatic acid, an amino-substituted and an oxy-substituted acid, predominantly acetic, lactic, glutamic and tartaric acid, are used as the organic carboxylic acids.

5. The method according to claims 1-3, characterized in that the acids are a product of protein hydrolysis.

6. The method according to claims 1-5, characterized in that in order to accelerate the reaction, additional sulfur-containing compounds are introduced into the mixture, wherein the additional sulfur-containing compounds are selected from the group comprising amino acids that release hydrogen sulfide during the reaction, lower alkyl mercaptans, lower alkyl sulfides, lower alkyl disulfides, hydrogen sulfide, and inorganic compounds having the formula  $MS_x$ , wherein M is selected from the group comprising an alkali metal, an alkaline earth metal and ammonium, and  $S_x$  is selected from the group comprising sulfide and hydrosulfide.

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2 文字コード及び他の略語については、定期発行される各 PCT ガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(54) Title: BODY TASTE IMPROVER COMPRISING LONG-CHAIN HIGHLY UNSATURATED FATTY ACID AND/OR ESTER THEREOF

(54) 発明の名称: 長鎖高度不飽和脂肪酸及び／又はそのエステル体を含むココ味向上剤

(57) Abstract: Means for improving the body taste of a food and improving the taste or flavor thereof. Provided are: a body taste improver which comprises as major components a long-chain highly unsaturated fatty acid and/or ester thereof and a body taste enhancer; a method of enhancing the effect of a body taste improver comprising a long-chain highly unsaturated fatty acid and/or ester thereof, which comprises adding a body taste enhancer to the body taste improver; a body taste improver which comprises a long-chain highly unsaturated fatty acid and/or ester thereof and is derived from a specific vegetable oil containing a large amount of  $\gamma$ -linolenic acid; a vegetable fat composition containing a long-chain highly unsaturated fatty acid and/or ester thereof, characterized by having an  $\alpha$ -linolenic acid content of 5% or lower; various foods each containing any of the body taste improvers and vegetable fat composition; and a method of improving the body taste of a food, which comprises incorporating any of the body taste improvers and vegetable fat composition into the food.

(57) 要約: 本発明の目的は、食品のコク味を向上させ、更に、その味又は風味を向上させる手段を提供することである。本発明は、主成分としての長鎖高度不飽和脂肪酸及び／又はそのエステル体及びココ味増強成分を含むココ味向上剤、長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るココ味向上剤にココ味増強成分を添加することによりココ味向上剤の効果を増強する方法、 $\gamma$ リノレン酸を多量に含む特定の植物油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るココ味向上剤、長鎖高度不飽和脂肪酸及び／又はそのエステル体を含む植物油脂組成物であって、 $\alpha$ リノレン酸の含量が 5% 以下であることを特徴とする植物油脂組成物、これらのココ味向上剤又は植物油脂組成物を含む各種食品、並びに、ココ味向上剤又は植物油脂組成物を食品に含有させることから成る食品のコク味を向上させる方法に係る。

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## 明 細 書

### 長鎖高度不飽和脂肪酸及び／又はそのエステル体を含むココ味向上剤 技術分野

[0001] 本発明は、長鎖高度不飽和脂肪酸及び／又はそのエステル体を主成分として含み、更に、 $\alpha$ トコフェロール及び鉄分等から成るココ味増強成分を含むココ味向上剤、長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るココ味向上剤にココ味増強成分を添加することによりココ味向上剤の効果を増強する方法、長鎖高度不飽和脂肪酸及び／又はそのエステル体を含むココ味向上剤、及び $\alpha$ リノレン酸含量が低い植物油脂から成る植物油脂組成物、更にこれらを含むココ味が向上した食品、並びに、ココ味向上剤又は植物油脂組成物を食品に含有させることから成る食品のココ味を向上させる方法等に関する。

### 背景技術

- [0002]  $\gamma$ リノレン酸及びアラキドン酸(シス-5, 8, 11, 14-エイコサテトラエン酸)は長鎖高度(多価)不飽和脂肪酸の一種であり動物の臓器及び組織から得られるリン脂質中に存在する。これは必須脂肪酸でありプロスタグランジン、トロンボキサンチン及びロイコトリエン等の合成の前駆体となる重要な化合物である。
- [0003] 従来、 $\gamma$ リノレン酸を比較的多量に含む月見草油やボラージ油、又はアラキドン酸等の長鎖高度不飽和脂肪酸及びそのエステルを、栄養強化及び各種生理的作用を付与する目的で油脂及び食品等の各種組成物へ添加することが試みられてきた。
- [0004] 特開平10-99048に記載の栄養強化組成物には、母乳に近い成分を実現する為に添加される成分の一種としてアラキドン酸が0.1-10重量%含有されている。
- [0005] 一方、エステル体の例としては、特開平4-197134に蒸発潜熱による生地内部の温度降下が防止されたフライ用油脂組成物が記載されているが、そこにはアラキドン酸等の不飽和脂肪酸が構成脂肪酸として20-60重量%含有されている。
- [0006] 特開平9-13075では、アラキドン酸等の長鎖多価不飽和脂肪酸を含むグリセリドからなる血中脂質濃度を低減する作用のある油脂が記載されているが、このグリセリドはエステル交換法により得られ、該長鎖多価不飽和脂肪酸の総量の40モル%未

満がグリセリドの2位に結合するという天然油とは異なる構造を有するものである。特開平9-13076では、同じ構成から成る血小板凝集能を抑制する作用のある油脂が記載されている。

- [0007] 又、特開平11-89513に記載のヒト乳脂肪に近似する合成脂質組成物には、アラキドン酸を含む長鎖n-6高度不飽和脂肪酸がトリグリセリドを構成する脂肪酸の一種として使用されている。
- [0008] 更に、特開平10-70992及び特開平10-191886にはアラキドン酸をトリグリセリドの形で豊富に含有する微生物由来の食用油脂が記載されており、この好適用途として、未熟児用調製乳、乳児用調製乳、幼児用食品及び妊婦用食品等が挙げられている。
- [0009] しかしながら、上記の従来技術のいずれにおいても、アラキドン酸等の長鎖多価不飽和脂肪酸を食品や植物油脂のコク等の風味を向上させる目的で使用することに関する開示はなく、このような目的に使用できる可能性を示唆する記載も見当たらない。
- [0010] 一方で、このような長鎖高度不飽和脂肪酸を添加した場合には、その酸化分解物の臭い(所謂「戻り臭」)が食品等の風味を損ねるという問題点があり、その解決策として様々な手段が講じられてきた。
- [0011] かかる手段の例として、例えば、特開昭63-44843に記載の油中水中油型乳化油脂組成物においては高度不飽和脂肪酸を内相油に含有することを特徴とする技術が開示されている。特開平6-172782では高度不飽和脂肪酸を含有する油脂を粉末化する技術が記載されている。特開平9-176679では不飽和脂肪酸粉状体に粉末状の抗酸化剤を混合させる技術が開示されている。特開平9-263784では多価不飽和脂肪酸を含有する油脂に $\delta$ -トコフェロールを含有させる技術が開示されている。又、特開平11-12592では高度不飽和脂肪酸を含有する魚脂類にしょうゆ油を添加することを特徴とする技術が開示されている。
- [0012] また、食品分野における長鎖高度不飽和脂肪酸の利用例として、特開2001-78702には、油脂とエキスを水中油型に乳化させることで、まろやかさ、後味、うま味が増強された調味料が開示されており、油脂の例として魚油又は魚油を含有する油脂が

挙げられており、魚油を構成する脂肪酸のうち $\omega$ 3系高度不飽和脂肪酸を10%以上含む例が記載されている。

- [0013] この調味料においては、含まれる油脂の酸化を抑制する為に乳化剤としてポリグリセリン脂肪酸エステルを用いたり、油脂の酸化を防ぐためにエキスを天然物から抽出されたカルノシン、及びアンセリン等の抗酸化物質が含まれていることがこの好ましいとされている。又、調味料を製造する段階で、加熱処理等の酸化処理は一切行われていない。更に、この調味料の効果を有効に発揮できる食品の例としては、水産練り製品、魚類、魚類加工品が挙げられているのみである。
- [0014] 又、特許第3220155号公報には、乳脂肪以外の脂肪酸等の酸化によって得ることができる香味料組成物が開示され、この脂肪酸が $\omega$ -3非共役二重結合系をもつ少なくとも1種類のポリ不飽和脂肪酸を0.01重量%を超える量含むことを特徴としている。この香味料組成物はバター様フレーバーに強く認められている甘く、クリーミーなノートが含まれるものであるが、かかるノートを得る為には油脂を必ず酸化処理する必要がある。そしてこの酸化処理は、酸化を若干遅らせるような量の酸化防止剤が存在するプロセスによる制御された酸化処理である必要がある。又、かかる酸化処理によって発生するフレーバーは揮発性成分であるので、酸化処理は密閉系で行うことが好ましいとされ、実施例においては還流凝縮器を使用して酸化処理を行っている。香味料組成物の用途としてはバターフレーバーをもつと有益な食品の香味付与に特に適していると記載されている。
- [0015] 米国特許第3689289号明細書(US3689289)には還元糖とアミノ酸及びアラキドン酸またはそのアラキドン酸メチルエステルを特定の条件下で加熱反応させることで人工的なチキンフレーバーを製造する方法が記載されている。また国際公開第WO03/051139号パンフレットには還元糖とアミノ酸及びアラキドン酸を特定の条件下で加熱反応させることによる人工的なチキンフレーバーを製造する方法においてアラキドン酸をグリセリンエステルの形で使用することにより、生成したチキンフレーバーの香りに耐熱性や持続性が生じることが記載されている。
- [0016] これらはいずれも糖とアミノ酸とアラキドン酸の3種の加熱反応物が人工的なチキン様の臭いを発現するもので、アラキドン酸等の長鎖高度不飽和脂肪酸が単独で、又

は長鎖高度不飽和脂肪酸と糖若しくはアミノ酸とで食品の呈味を改善するという記載は見られない。

[0017] 更に、特開2002-95439号公報には、高度不飽和脂肪酸グリセリドを含有すること  
を特徴とする調味料が開示されている。この発明の目的は、酸化劣化されやすい高  
度不飽和脂肪酸グリセリドの酸化安定性を高めることであり、その為に、大豆の発酵  
加工食品、魚介類の発酵加工食品もしくはトマト成分を主体とした調味料に高度不  
飽和脂肪酸グリセリドを含ませることを特徴とするものである。従って、この発明は、高  
度不飽和脂肪酸グリセリドを含有させることにより食品のコク味を向上することに関し  
ては何等開示又は示唆していない。

[0018] 特許文献1:特許第3220155号公報

特許文献2:米国特許第3689289号明細書

特許文献3:国際公開第WO03/051139号パンフレット

特許文献4:特開2002-95439号公報

発明の開示

発明が解決しようとする課題

[0019] ところで、食品の分野において、とんかつ等の油調食品やカレー、餃子等の油脂含  
有食品等、食品によっては「コク」や「濃厚感」が必要なものがある。そのような食品へ  
「コク」や「濃厚感」を賦与するため、従来は、香料を添加したり、動物性油脂を単独ま  
たは植物油脂に配合して使用していた。

[0020] しかしながら、香料を添加したものにおいては、加熱調理中に香料が揮発し、賦与  
した「コク味」が持続しないという課題があった。また動物油脂の使用は同油脂に含ま  
れるコレステロールや飽和脂肪酸の健康への影響が懸念されていた。植物油脂はノ  
ンコレステロールで飽和脂肪酸が少ないが、植物油脂で調理した食品は「あっさり」し  
ており、「コク味」を必要とする食品には「物足りなさ」が感じられるという課題があった  
。よって、ノンコレステロールで飽和脂肪酸が少なく、しかも「コク味」のある油脂の実  
現が望まれていた。

[0021] 本発明者等は上記の課題を解決すべく研究した結果、従来は肉類等の腐臭等、オ  
フフレーバーの原因物質とされてきたアラキドン酸等の長鎖高度不飽和脂肪酸及び

／又はそのエステル体を単独で食品に含有させるか、又はそれを特定の範囲で含有する植物油脂で加熱調理などの酸化処理をした場合に、食品のコク味が増し、味を引き立たす効果が得られることを既に見出した(PCT/JP03/00182)。

#### 課題を解決するための手段

- [0022] 本発明者は上記の課題を解決すべく更に研究を重ねた結果、長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤に、更に、 $\alpha$ トコフェロール及び鉄分等から成るコク味増強成分を含ませることによって、コク味向上効果が一層向上することを見出した。更に、 $\alpha$ リノレン酸及び／又はリノール酸の含量が低い植物油脂に長鎖高度不飽和脂肪酸及び／又はそのエステル体を添加することによって、コク味が一層向上した植物油脂組成物が得られることを見出し、本発明を完成した。
- [0023] 即ち、本発明は、主成分としての長鎖高度不飽和脂肪酸及び／又はそのエステル体及びコク味増強成分を含むコク味向上剤、 $\gamma$ リノレン酸を多量に含む特定の植物油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤、長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤にコク味増強成分を添加することによりコク味向上剤の効果を増強する方法、長鎖高度不飽和脂肪酸及び／又はそのエステル体を含む植物油脂組成物であって、 $\alpha$ リノレン酸の含量が5%以下であることを特徴とする植物油脂組成物、これらのコク味向上剤又は植物油脂組成物を含むコク味が向上した各種食品、コク味向上剤又は植物油脂組成物を食品に含有させることから成る、食品のコク味を向上させる方法、並びに、長鎖高度不飽和脂肪酸及び／又はそのエステル体及びコク味増強成分を個別に食品に添加することから成る、食品のコク味を向上させる方法に係る。
- [0024] 本明細書中において、「コク味向上剤」とは、これを添加した食品に有意な「コク味」や「濃厚感」を新たに付与したり、それらを向上させることという本発明の効果が得られるものをいう。このような本発明の効果に関する評価は、本明細書中の実施例に示した官能評価法によって行うことが出来る。
- [0025] 更に本明細書中において、「コク味増強成分」とは、長鎖高度不飽和脂肪酸及び／又はそのエステル体によるこのような効果を相加的又は相乗的に高める作用を有する成分をいう。

## 発明の効果

[0026] 長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤に、更に、 $\alpha$ トコフェロール及び鉄分等から成るコク味増強成分を含ませることによって、コク味向上効果が一層向上することを見出した。更に、 $\alpha$ リノレン酸及び／又はリノール酸の含量が低い植物油脂に長鎖高度不飽和脂肪酸及び／又はそのエステル体を添加することによって、コク味が一層向上した植物油脂組成物が得られることを見出した。

## 発明を実施するための最良の形態

[0027] 本発明におけるコク味増強成分の種類・構造等に特に制限はないが、例えば、その代表的な例として、 $\alpha$ トコフェロール及び鉄分を挙げることが出来る。理論上、本発明を何等拘束するものではないが、 $\alpha$ トコフェロール及び鉄分は、油脂の酸化を促進する効果があることが知られている。

[0028] 鉄分の供給原料として、硫酸第1鉄、クエン酸第1鉄、クエン酸鉄、グルコン酸第1鉄、塩化第2鉄、乳酸鉄等の鉄塩類、ヘム鉄、血漿粉末、血球粉末等の、市販されている当業者に公知の任意の鉄含有素材等を使用することができる。Feの形態として、鉄、第1鉄塩及び第2鉄塩があるが、好ましくは第1鉄塩である。尚、鉄分は、溶解・分散・乳化等の任意の方法で長鎖高度不飽和脂肪酸及び／又はそのエステル体と混合することが出来る。

[0029]  $\alpha$ トコフェロールの供給原料としても、当業者に公知の任意のものを使用することが出来る。例えば、全トコフェロール組成中で $\alpha$ トコフェロールが最も多く含まれているようなトコフェロール製剤、具体的には、全量中の50%以上が $\alpha$ トコフェロールから成るトコフェロール製剤が市販されているので、それをそのまま $\alpha$ トコフェロールの供給原料として使用することが出来る。又、高濃度の $\alpha$ トコフェロールを含有する植物油脂を $\alpha$ トコフェロールの供給原料として使用することも出来る。或いは、適当なトコフェロール製剤から、当業者に公知の方法で $\beta$ 、 $\gamma$ 、 $\delta$ トコフェロールを低減ないし除去することによって $\alpha$ トコフェロール濃度を高めたものを使用することも出来る。

[0030] これらコク味増強成分のコク味向上剤中の含量に特に制限はないが、効果及び経済性などの点から、 $\alpha$ トコフェロールの場合には、好ましくは50～15000ppm、より

好ましくは50～5000ppm、更に好ましくは100～2000ppmである。又、鉄分の場合には、Fe換算で0.1～200ppm、好ましくは0.5ppm～100ppmを含有する。

[0031] 本発明で「長鎖高度不飽和脂肪酸」とは、n-3系の長鎖高度不飽和脂肪酸の場合には炭素数が20以上かつ二重結合を3つ以上有する脂肪酸を意味し、n-6系の長鎖高度不飽和脂肪酸の場合には炭素数が18以上かつ二重結合を3つ以上有する脂肪酸を意味する。更に、n-3系及びn-6系の双方ともに炭素数が20～24かつ二重結合を4～6有する長鎖高度不飽和脂肪酸が好ましい。n-6系の長鎖高度不飽和脂肪酸の例として、リノレン酸、アラキドン酸(AA)及びドコサテトラエン酸(DTA)を挙げることが出来、特に、アラキドン酸が好適である。又、n-3系の長鎖高度不飽和脂肪酸の例として、ドコサヘキサエン酸(DHA)及びエイコサペンタエン酸(EPA)を挙げることが出来る。

[0032] アラキドン酸等の本発明で使用する長鎖高度不飽和脂肪酸及びそのエステル体の由来に特に制限はなく、各種動植物、微生物、藻類等から得られたものが市販されており、これら当業者には公知のものを適宜使用することが出来る。

[0033] 例えば、上記の特開平10-70992及び特開平10-191886に記載されたアラキドン酸をトリグリセリドの形で豊富に含有する微生物由来の食用油脂を使用することが出来る。このようにアラキドン酸等の本発明の活性成分である脂肪酸及びそのエステル体として微生物由来のものを使用した場合には、動物由来の油脂を実質的に含有しないノンコレステロールで飽和脂肪酸含量が少ないコク味向上剤又は食品を得ることが出来る。

[0034] 2種以上の長鎖高度不飽和脂肪酸とは異なる原料から得られた同種の脂肪酸を適宜混合して使用することも可能である。

[0035] エステル体の構造及びその製造方法に特に制限はなく、これを構成するアルコール類としては、一価及び多価アルコールを使用することが出来る。多価アルコールの中でも、安全性やコストの点から好ましいものの例としてグリセロールをあげることができ、この場合にエステル体としてトリグリセリド、ジグリセリド及びモノグリセリドを構成する。これらのエステル体を構成する脂肪酸中に本発明の長鎖高度不飽和脂肪酸以外の脂肪酸が含まれていても良い。

- [0036] 大豆油、トウモロコシ油、オリーブ油、HOS、及びカノーラ油等の植物油にはγリノレン酸は含まれていない。一方、これに対して、ボラージ(ポリジ)油、月見草油、ローズヒップ油、及びブラックカラント油には、約3%～22%程度のγリノレン酸が含まれている。特に、ボラージ油には約22%もγリノレン酸が含まれており、本発明の長鎖高度不飽和脂肪酸の原料として好適に使用できる。
- [0037] 従って、本発明は、ボラージ油、月見草油、ローズヒップ油、又はブラックカラント油から選ばれた植物油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤、特に、ボラージ油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤に係る。
- [0038] 本発明のコク味向上剤中の長鎖高度不飽和脂肪酸及び／又はそのエステル体の含有量に特に制限はないが、含有量があまり少ないと所望の効果をj得るために多量のコク味向上剤が必要とされ、その他の成分に由来する雑味の悪影響が生じる可能性もある。従って、本発明のコク味向上剤は、長鎖高度不飽和脂肪酸及び／又はそのエステル体を、好ましくは10重量%以上、より好ましくは30重量%以上含有するものである。
- [0039] コク味向上剤中には、上記活性成分の他に、コク味向上剤のj効果に悪影響を与えない限り、当業者に公知の他の任意成分、例えば、乳化剤、ステロール類、リン脂質、その他の脂肪酸、その他の脂肪酸より構成されるトリグリセリド、ジグリセリド及びモノグリセリド等が含まれていても良い。
- [0040] 尚、n-3系の長鎖高度不飽和脂肪酸及び／又はそのエステル体を使用する場合に効果を充分得るためにはそれらを酸化処理することが望ましい。酸化処理の方法に特に制限はないが、その一例として加熱処理があげられる。加熱処理の方法に特に制限はないが、酸化防止剤を存在させる必要はなく、又、酸化処理を密閉系で行う必要もない。開放系において、通常、40℃～200℃において0.1時間～240時間加熱する方法があり、好ましくは、80℃～180℃において0.5時間～72時間加熱する。
- [0041] 又、n-6系の長鎖高度不飽和脂肪酸及び／又はそのエステル体の効果を發揮するために酸化処理は必要ないが、酸化処理することによって、その効果が一層増す。

- [0042] 尚、本発明の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤、又はそれを含有する食品を同様に加熱等の酸化処理することによっても、同様の効果を実施することが出来る。
- [0043] 尚、エステル体の中でも特にグリセリンエステルの場合には、長鎖高度不飽和脂肪酸はそれらのエステル体に比べて揮発性が高いので、より少量で本発明の効果を達成することが出来る。対して、エステル体は揮発性が比較的低い一方で持続性に優れているので、エステル体を含む場合には相対的に含有量が多くなる。
- [0044] 更に、本発明は、以上のコク味向上剤を含む植物油脂組成物も含むものである。ここで、ベースとなる植物油脂としては、当業者に公知に任意のものを使用することが出来る。このような植物油脂の例として、例えば、大豆油、菜種油、コーン油、ひまわり油、HOS、米油、ごま油、オリーブ油、及びパーム油等を挙げることが出来る。この中でも、特に、フライや炒め物などの加熱調理に主に利用される大豆油、菜種油、コーン油、及びパーム油等に本発明のコク味向上剤を添加することによって、本発明の効果を有利に達成することが出来る。任意の2種類以上の植物油脂を適宜混合して使用することも出来る。
- [0045] かかる植物油脂組成物中の長鎖高度不飽和脂肪酸はそれらのエステル体の含有量は、長鎖高度不飽和脂肪酸の種類、植物油脂組成物の用途等に応じて当業者が適宜選択することが出来るが、コク味が向上した植物油脂組成物であるためには、長鎖高度不飽和脂肪酸として通常、10〜100,000ppm、好ましくは、10〜20,000ppm、より好ましくは10〜5000ppm、更に好ましくは20〜1000ppmである。特に、γリノレン酸等の植物油由来の長鎖高度不飽和脂肪酸を含む植物油脂組成物を、炒めやフライ用といった油調用油脂、風味油又は香味油のベース油等として使用する場合には、植物油脂組成物中のγリノレン酸等の長鎖高度不飽和脂肪酸の含量は、通常、0.05〜10%、好ましくは0.1〜5%含有する。
- [0046] 尚、既に記載したように、ボラージ(ポリジ)油、月見草油、ローズヒップ油、及びブラックカラント油には約3%〜22%程度のγリノレン酸が既に含まれている。従って、これらの植物油は、特に長鎖高度不飽和脂肪酸はそれらのエステル体を外部から添加しなくとも、それ自体本発明の植物油脂組成物として有利に使用することも出来る。

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- [0047] 又、本発明者は、本発明で使用する長鎖高度不飽和脂肪酸及び／又はそのエステル体と混合される植物油脂の脂肪酸組成がある条件を満たしているような場合に、より効果的にコク味の向上効果が得られることを見出した。
- [0048] 即ち、本発明の植物油脂組成物において、 $\alpha$ リノレン酸の含量が5%以下、例えば、 $\alpha$ リノレン酸の含量が0.01%～5%、好ましくは0.05%～3%である植物油脂組成物が好ましい。更に、オレイン酸含量が20～86%及び／又はリノール酸含量が3～25%であるものがより好ましい。
- [0049] 既に記載したように、植物油脂組成物における長鎖高度不飽和脂肪酸及び／又はそのエステル体の含量は、長鎖高度不飽和脂肪酸として通常、10～100,000ppm、好ましくは、10～20,000ppm、より好ましくは10～5000ppm、更に好ましくは20～1000ppmである。尚、このような植物油脂組成物において、コク味増強成分は必ずしも含まれている必要はない。
- [0050] 尚、ボラージ(ポリジ)油及びブラックカラント油には $\alpha$ リノレン酸が実質的に含有されておらず、オレイン酸含量も上記の範囲である。従って、これらの油はこの点からもそれ自体植物油脂組成物として好適なものである。
- [0051] こうして得られる本発明の植物油脂組成物は、様々な加熱調理法、例えば、80～300℃、より好ましくは110～300℃に加熱する調理法に使用することができる。このような温度範囲で加熱すると、本発明の植物油脂組成物を用いて調理した食品のコク味が増し、食品の味を一層引き立たせることが出来る。
- [0052] 最後に、本発明は、本発明のコク味向上剤、又は植物油脂組成物を含むコク味が向上した食品にも係る。ここで、対象となる食品の種類に特に制限はなく、例えば、各種フライ食品及び炒め物等の油調食品、並びに、カレー、餃子、及び焼売等の油脂添加食品を挙げることが出来る。本発明の食品は、それに含まれる本発明に係るコク味向上剤又はこれを含む植物油脂組成物によって、有意な「コク味」や「濃厚感」が付与されている。これらの食品は、既に記載したような加熱処理されることによって、更にそのコク味が向上する。
- [0053] 従って、本発明は更に、本発明のコク味向上剤又は植物油脂組成物を食品に含有

させることから成る、食品のコク味を向上させる方法に係る。ここで、本発明のコク味向上剤に含まれる長鎖高度不飽和脂肪酸及び／又はそのエステル体並びにコク味増強剤は、夫々個別に食品に添加することによっても同様な効果を得ることが出来る。従って、本発明は、更に、長鎖高度不飽和脂肪酸及び／又はそのエステル体、及びコク味増強成分を個別に食品に添加することから成る、食品のコク味を向上させる方法にも係る。尚、このように個別に添加する際には、食品中の長鎖高度不飽和脂肪酸及び／又はそのエステル体並びにコク味増強剤の最終的な含量は、本発明のコク味向上剤を添加した場合と同様なものとなるようにすることが好ましい。尚、これら各成分の添加時期・順序等は食品の種類等に応じて、当業者が適宜選択することが出来る。

[0054] 食品中に含有される本発明のコク味向上剤又はこれを含む植物油脂組成物の量に特に制限はないが、通常、喫食時に長鎖高度不飽和脂肪酸及び／又はそのエステル体の量に換算して、0.1～100,000ppm、より好ましくは0.1～10,000ppmを含有させることによって、食品のコク味向上効果が得られる。例えば、醤油、スープ等の液状食品に対しては、喫食時に長鎖高度不飽和脂肪酸及び／又はそのエステル体の量に換算して、好ましくは1～1,200ppm、より好ましくは1～500ppmを含有させることによって、食品のコク味向上効果が得られる。又、ハンバーグのような固形食品においては、長鎖高度不飽和脂肪酸及び／又はそのエステル体の量に換算して、好ましくは20～2,500ppm、より好ましくは20～1,000ppmを含有させることによって、食品のコク味向上効果が得られる。

[0055] 以下に、実施例により本発明をさらに具体的に説明するが、本発明の技術的範囲はそれに限定されるものではない。尚、本明細書中、特に断わりがない限り、「％」は「重量％」を意味する。

[0056] 本発明において、トコフェロール組成は基準油脂分析法（日本油化学会編）2.4.10-1996に従って分析することが出来る。又、脂肪酸含量は基準油脂分析法（日本油化学会編）2.4.2.2-1996に基づき分析することが出来る。

[0057] <官能評価法>

以下の官能評価において「コク味が向上する」とは各表中の評価項目にある「香り

の強さ」、「風味の強さ」、「味の強さ」及び「後味の強さ」がそれぞれの「香りの好ましさ」、「風味の好ましさ」、「味の好ましさ」及び「後味の好ましさ」を向上させる若しくは損なうことなく増大することである。

[0058] パネル n=7

以下の実施例の結果を示した表における記号の意味は以下のとおりである。

×:コントロールより弱いまたは好ましくない;△:コントロールと同等;○:コントロールより強いまたは好ましい;◎コントロールより明らかに強いまたは好ましい

#### 実施例

[0059] <使用した長鎖不飽和脂肪酸>

アラキドン酸含有トリグリセリド(AATG:純度40〜45%:ナカライテスク(株)販売、サントリー(株)製造)、ボラージ油(γリノレン酸20%:Statfold社製)、低αリノレン酸菜種油(Low Linolenic Canola Oil、以下、「LLC」、味の素製油(株))、菜種油(以下、「CO」、味の素製油(株))、高オレイン酸種紅花油(High Oleic Safflower Oil、以下、「HOS」、味の素製油(株))を使用した。

[0060] [表1]

脂肪酸組成 (%)

|     | C16 | C18:0 | C18:1 | C18:2 | C18:3 (n-3) |
|-----|-----|-------|-------|-------|-------------|
| CO  | 3.9 | 1.9   | 62.5  | 19.5  | 8.8         |
| HOS | 4.6 | 1.9   | 76.3  | 14.2  | 0.2         |
| LLC | 3.3 | 1.7   | 73.5  | 15.4  | 2.4         |

[0061] [表2]

トコフェロール製剤及び含量  
「ビタミンE 5-67」ADM社

|           | α   | β  | γ | δ |
|-----------|-----|----|---|---|
| 含量 (mg/g) | 707 | 16 | 4 | 3 |

[0062] <αトコフェロールのコク味増強成分としての効果>

以下の組成で長鎖高度不飽和脂肪酸及び/またはそのエステル体及びαトコフェロール製剤と植物油脂を混合しコク味向上剤を調製した。

- (1) LLC
- (2) 1%AATG/LLC (AA0. 4%)
- (3) 0. 5%AATG/LLC (AA0. 2%)
- (4) 1%AATG + 0. 002%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 4%、 $\alpha$ トコフェロール14.1ppm)
- (5) 1%AATG + 0. 01%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 4%、 $\alpha$ トコフェロール70.7ppm)
- (6) 1%AATG + 0. 02%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 4%、 $\alpha$ トコフェロール141ppm)
- (7) 1%AATG + 0. 2%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 4%、 $\alpha$ トコフェロール1410ppm)
- (8) 1%AATG + 2%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 4%、 $\alpha$ トコフェロール14100ppm)
- (9) 0. 5%AATG + 0. 02%  $\alpha$ トコフェロール製剤/LLC  
(AA0. 2%、 $\alpha$ トコフェロール141ppm)

[0063] 調製油15gに薄力粉15gを混合し120℃で30分炒めた後にカレー粉(「特製エスビーカレー」、エスビー食品(株))3gを添加しさらに10分間加熱しカレールーを調製した。コンソメスープ(「コンソメ」味の素(株)1. 7%溶液)500mlを添加し加熱しコンソメスープを調製した。カレールーをコンソメスープで希釈しカレースープを調製した。

[0064] [表3]

(1) (コントロール) と (2) の比較

| 調製油 (コク味向上剤)  | (1) | (2)   |
|---------------|-----|-------|
| AA 喫食時濃度(ppm) | 0   | 112.5 |
| 香りの強さ         | —   | ◎     |
| 香りの好ましさ       | —   | ◎     |
| 風味の強さ         | —   | ◎     |
| 風味の好ましさ       | —   | ◎     |
| 味の強さ          | —   | ◎     |
| 味の好ましさ        | —   | ◎     |
| 後味の強さ         | —   | ◎     |
| 後味の好ましさ       | —   | ◎     |

[0065] [表4]

| (2) (コントロール) と (3)、(4)、(5)、(6)、(7)、(8)、(9) の比較 |       |      |       |       |       |       |       |      |
|------------------------------------------------|-------|------|-------|-------|-------|-------|-------|------|
| 調製油                                            | (2)   | (3)  | (4)   | (5)   | (6)   | (7)   | (8)   | (9)  |
| 油中 $\alpha$ トコフェロール濃度 (ppm)                    | 0     | 0    | 14    | 71    | 141   | 1410  | 14100 | 141  |
| AA 喫食時濃度(ppm)                                  | 112.5 | 56.3 | 112.5 | 112.5 | 112.5 | 112.5 | 112.5 | 56.3 |
| 香りの強さ                                          | —     | ×    | △     | ○     | ○     | ◎     | ◎     | ○    |
| 香りの好ましさ                                        | —     | ×    | △     | ◎     | ◎     | ◎     | ◎     | ○    |
| 風味の強さ                                          | —     | ×    | △     | ○     | ○     | ◎     | ◎     | ○    |
| 風味の好ましさ                                        | —     | ×    | △     | ○     | ◎     | ◎     | ◎     | ○    |
| 味の強さ                                           | —     | ×    | △     | ◎     | ◎     | ◎     | ◎     | ○    |
| 味の好ましさ                                         | —     | ×    | △     | ◎     | ◎     | ◎     | ○     | ○    |
| 後味の強さ                                          | —     | ×    | △     | ◎     | ◎     | ◎     | ◎     | ○    |
| 後味の好ましさ                                        | —     | ×    | △     | ○     | ○     | ○     | ○     | ○    |

[0066] 上記表4に示した結果において、(2) (コントロール:  $\alpha$ トコフェロールを含有しない) と(4)、(5)、(6)、(7)、(8)の比較において、AATGがカレー中に同濃度でも、(5)、(6)、(7)、(8)の濃度の $\alpha$ トコフェロールを含有することによりコク味向上効果が増強されたことが判明した。更に、(2)と(3)の比較において、コク味向上効果はAATG濃度の低い(3)は(2)に比べ劣るが、 $\alpha$ トコフェロールを添加した(9)は(3)とAATG濃度が同じでも(2)以上のコク味向上効果を発現したことが判明した。

[0067] <鉄成分のコク味増強成分としての効果>

2.5%AATG/LLCに対し、硫酸第1鉄・7水塩を0.00005〜0.1% (Fe: 0.1〜200ppm) 添加して均一に分散させた後、0.8%食塩水に0.1%添加した。

(1) 2.5%AATG/LLC

(2) 硫酸第1鉄・7水塩 0.00005%添加 (Fe:0.1ppm) /2.5%AATG/LLC

(3) // 0.00025% (Fe:0.5ppm) /2.5%AATG/LLC

(4) // 0.005% (Fe:10ppm) /2.5%AATG/LLC

(5) // 0.05% (Fe:100ppm) /2.5%AATG/LLC

(6) // 0.1% (Fe:200ppm) /2.5%AATG/LLC

[0068] [表5]

| 調製油             | (1) | (2) | (3) | (4) | (5) | (6) |
|-----------------|-----|-----|-----|-----|-----|-----|
| 喫食時 AA 濃度 (ppm) | 10  | 10  | 10  | 10  | 10  | 10  |
| 油中 Fe 濃度 (ppm)  | 0   | 0.1 | 0.5 | 10  | 100 | 200 |
| 香りの強さ           | —   | △   | ○   | ◎   | ◎   | ◎   |
| 香りの好ましさ         | —   | ○   | ○   | ◎   | ○   | △   |
| 風味の強さ           | —   | △   | ○   | ◎   | ◎   | ◎   |
| 風味の好ましさ         | —   | ○   | ○   | ○   | ○   | △   |
| 味の強さ            | —   | △   | ○   | ◎   | ◎   | ◎   |
| 味の好ましさ          | —   | ○   | ○   | ◎   | ○   | △   |

[0069] 表5に示した結果から、(1) (コントロール)と(2)、(3)、(4)、(5)、(6)の比較において、AATGが食塩水中に同濃度でも、(3)、(4)、(5)、(6)の濃度の鉄分を含有することにより香り、風味、味の強さが増強されたことが判明した。また(2)、(3)、(4)、(5)の鉄濃度では香り、風味、味が(1)に比べ好まれた。(6)は鉄由来と思われる香り及び味の影響により、香り及び味が(3)、(4)、(5)に比べ劣っていた。

[0070] ラーメンスープ(妃湯(フェイタン)とんこつ醤油:味の素(株)製の9倍希釈液)に5% AATG/LLCと硫酸第1鉄・7水塩を下記配合比で添加し、味風味を評価した。

(1) 5%AATG/LLCのみ 1g/1000gラーメンスープ

(2) (1) + 硫酸第1鉄・7水塩 0.001mM/1000gラーメンスープ (Fe:0.06ppm)

(3) (1) + 硫酸第1鉄・7水塩 0.01mM/1000gラーメンスープ (Fe: 0.56ppm)

(4) (1) + 硫酸第1鉄・7水塩 0.1mM/1000gラーメンスープ (Fe: 5.6ppm)

(5) (1) + 硫酸第1鉄・7水塩 1.0mM/1000gラーメンスープ (Fe: 56ppm)

(6) (1) + 硫酸第1鉄・7水塩 5.0 mM/1000gラーメンスープ (Fe: 280ppm)

[0071] [表6]

| 調製油             | (1) | (2)  | (3)  | (4) | (5) | (6) |
|-----------------|-----|------|------|-----|-----|-----|
| 喫食時 AA 濃度 (ppm) | 20  | 20   | 20   | 20  | 20  | 20  |
| Fe 濃度 (ppm)     | 0   | 0.06 | 0.56 | 5.6 | 56  | 280 |
| 香りの強さ           | —   | △    | ○    | ◎   | ◎   | ◎   |
| 香りの好ましさ         | —   | ○    | ○    | ◎   | ○   | △   |
| 風味の強さ           | —   | △    | ○    | ◎   | ◎   | ◎   |
| 風味の好ましさ         | —   | ○    | ○    | ○   | ○   | △   |
| 味の強さ            | —   | △    | ○    | ◎   | ◎   | ◎   |
| 味の好ましさ          | —   | ○    | ◎    | ○   | ○   | △   |

[0072] 表6に示した結果から、(1) (コントロール)と(2)、(3)、(4)、(5)の比較において、AATGがラーメンスープ中に同濃度でも、(3)、(4)、(5)、(6)の濃度の鉄分を含有することにより香り、風味、味の強さが増強された。また(2)、(3)、(4)、(5)の鉄濃度では香り、風味、味が(1)に比べ好まれた。(6)は鉄由来と思われる香り及び味の影響により、香り及び味が(3)、(4)、(5)に比べ劣っていた。

[0073] <ボラージ油のコク味向上剤としての効果>

ボラージ油とLLCで表のような植物油脂組成物を調製し、「シュースtring」(味の素冷凍食品(株))150gを各油脂3kgを用いて180℃で3分間揚げ、フライドポテトを調理した。

[0074] [表7]

| ボラージ油<br>含量 (%)  | 0 | 0.1  | 0.5 | 1   | 5 | 10 | 20 | 30 | 50 | 100 |
|------------------|---|------|-----|-----|---|----|----|----|----|-----|
| ャレノレン<br>酸含量 (%) | 0 | 0.02 | 0.1 | 0.2 | 1 | 2  | 4  | 6  | 10 | 20  |
| 香りの強さ            | — | △    | ○   | ◎   | ◎ | ◎  | ◎  | ◎  | ◎  | ◎   |
| 香りの好ましさ          | — | △    | ○   | ◎   | ◎ | ◎  | ○  | ○  | ○  | ×   |
| 風味の強さ            | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ◎  | ◎  | ○   |
| 風味の好ましさ          | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ○  | ○  | ×   |
| 味の強さ             | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ◎  | ◎  | ◎   |
| 味の好ましさ           | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ○  | ○  | ×   |
| 後味の強さ            | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ◎  | ◎  | ◎   |
| 後味の好ましさ          | — | △    | ○   | ○   | ◎ | ◎  | ◎  | ○  | ○  | ×   |

[0075] 長鎖高度不飽和脂肪酸として $\gamma$ リノレン酸を含有するボラージ油でシューestringを揚げることによりシューestringにコク味が付与された。一方で、油中に過剰な $\gamma$ リノレン酸を含有させると風味、味を損なう結果となった。

[0076] 次に、以下のように調製油を使用して炊き込みピラフを調理した。

(1) LLC

(2) 3%ボラージ油/LLC (0.6%  $\gamma$ リノレン酸)

(3) 30%ボラージ/LLC (6%  $\gamma$ リノレン酸)

(4) ボラージ油 (20%  $\gamma$ リノレン酸)

無洗米200gに水300gを加え、「ライスクック

炒飯用」(味の素(株))10g及び各調製油を添加し、炊飯器にてピラフを調理した。

その結果、以下の表8に示されるように、適当な量の $\gamma$ リノレン酸を含有するボラージ油をピラフに添加することによりピラフにコク味が付与された。

[0077] [表8]

| 調製油                        | (1) | (2) | (3) | (4)  |
|----------------------------|-----|-----|-----|------|
| 添加量 (g)                    | 5   | 5   | 5   | 5    |
| $\gamma$ リノレン酸の添加時濃度 (ppm) | 0   | 58  | 580 | 1942 |
| 香りの強さ                      | —   | ○   | ◎   | ◎    |
| 香りの好ましさ                    | —   | ○   | ◎   | ◎    |
| 風味の強さ                      | —   | ○   | ◎   | ◎    |
| 風味の好ましさ                    | —   | ○   | ◎   | ○    |
| 味の強さ                       | —   | ○   | ◎   | ◎    |
| 味の好ましさ                     | —   | ○   | ◎   | ○    |
| 後味の強さ                      | —   | ○   | ◎   | ◎    |
| 後味の好ましさ                    | —   | ○   | ◎   | ○    |

[0078] <脂肪酸組成の効果>

以下のように油脂を調製した。

(1) 0.0625%AATG/CO (AA含量250ppm)

(2) 0.125%AATG/CO

(AA含量500ppm)

(3) 0.0625%AATG/LLC

(AA含量250ppm)

(4) 0.0625%AATG/HOS

(AA含量250ppm)

[0079] 「とんかつ」は75gの豚ロース肉に塩0.6g、胡椒少々をまぶし、小麦粉、20%卵溶液の順で付着させ、生パン粉を付け、各調整油で180℃、30分揚げた。その結果、以下の表9に示されるように、同じAA濃度でも添加する油脂の脂肪酸組成によりコク味向上効果が異なった。具体的には、 $\alpha$ リノレン酸(C18:3 (n-3))の含量が5%以下である油脂(HOS、LLC)がより好ましいことが判明した。

[0080] [表9]

| とんかつ    |        |        |        |        |
|---------|--------|--------|--------|--------|
|         | (1)    | (2)    | (3)    | (4)    |
|         | CO     | CO     | LLC    | HOS    |
| AATG 含量 | 250ppm | 500ppm | 250ppm | 250ppm |
| 香りの強さ   | △      | ◎      | ◎      | ◎      |
| 香りの好ましさ | △      | ○      | ○      | ○      |
| 風味の強さ   | △      | ◎      | ◎      | ◎      |
| 風味の好ましさ | △      | ○      | ○      | ○      |
| 味の強さ    | △      | ◎      | ◎      | ◎      |
| 味の好ましさ  | △      | ◎      | ◎      | ◎      |
| 後味の強さ   | △      | ◎      | ◎      | ◎      |
| 後味の好ましさ | △      | ○      | ○      | ◎      |

#### 産業上の利用可能性

[0081] 本発明コク味向上剤又はそれを含む植物油脂組成物を使用し調理することによって、食品に「コク」や「濃厚感」を賦与することが出来る。

### 請求の範囲

- [1] 主成分としての長鎖高度不飽和脂肪酸及び／又はそのエステル体、及びコク味増強成分を含むコク味向上剤。
- [2] コク味増強成分が $\alpha$ トコフェロール及び／又は鉄分である、請求項1記載のコク味向上剤。
- [3]  $\alpha$ トコフェロールを50～15000ppm含有する、請求項2記載のコク味向上剤。
- [4] 含まれるトコフェロール全量中、 $\alpha$ トコフェロールが50%以上である、請求項2記載のコク味向上剤。
- [5] 鉄分をFe換算で0.5～100ppm含有する、請求項2記載のコク味向上剤。
- [6] 長鎖高度不飽和脂肪酸がn-6系である請求項1ないし5のいずれか一項に記載のコク味向上剤。
- [7] 長鎖高度不飽和脂肪酸がアラキドン酸である、請求項6記載のコク味向上剤。
- [8] アラキドン酸が微生物由来である、請求項7記載のコク味向上剤。
- [9] 長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤にコク味増強成分を添加することによりコク味向上剤の効果を増強する方法。
- [10] コク味増強成分が $\alpha$ トコフェロール及び／又は鉄分である、請求項9記載の方法。
- [11] ボラージ油、月見草油、ローズヒップ油、又はブラックカラント油から選ばれた植物油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤。
- [12] ボラージ油由来の長鎖高度不飽和脂肪酸及び／又はそのエステル体から成るコク味向上剤である、請求項11記載のコク味向上剤。
- [13] 請求項11ないし12のいずれか一項記載のコク味向上剤を含む植物油脂組成物。
- [14]  $\alpha$ リノレン酸の含量が5%以下であることを特徴とする、請求項13記載の植物油脂組成物。
- [15] オレイン酸含量が20～86%及び／又はリノール酸含量が3～25%である、請求項13又は14記載の植物油脂組成物。
- [16] 長鎖高度不飽和脂肪酸及び／又はそのエステル体を含む植物油脂組成物であって、 $\alpha$ リノレン酸の含量が5%以下であることを特徴とする植物油脂組成物。
- [17] 長鎖高度不飽和脂肪酸及び／又はそのエステル体を長鎖高度不飽和脂肪酸の含

- 量が10～100,000ppmである、請求項16記載の植物油脂組成物。
- [18] オレイン酸含量が20～86%及び／又はリノール酸含量が3～25%である、請求項16又は17記載の植物油脂組成物。
- [19] 長鎖高度不飽和脂肪酸がn-6系である請求項16ないし18のいずれか一項に記載の植物油脂組成物。
- [20] 長鎖高度不飽和脂肪酸がアラキドン酸である、請求項19記載の植物油脂組成物。
- [21] アラキドン酸が微生物由来である、請求項20記載の植物油脂組成物。
- [22] 請求項1～8、11及び12のいずれか一項に記載のコク味向上剤、又は請求項13ないし21のいずれか一項に記載の植物油脂組成物を含むコク味が向上した食品。
- [23] 請求項1～8、11及び12のいずれか一項に記載のコク味向上剤、又は請求項13ないし21のいずれか一項に記載の植物油脂組成物を食品に含有させることから成る、食品のコク味を向上させる方法。
- [24] 長鎖高度不飽和脂肪酸及び／又はそのエステル体、及びコク味増強成分を個別に食品に添加することから成る、食品のコク味を向上させる方法。

# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
Int.Cl<sup>7</sup> A23L1/226, A23L1/22, A23D9/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
JSTPlus (JOIS)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                            | Relevant to claim No.   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| X         | Hiroshi KATO, "Borage-yu no Seijo to Oyo",<br>FRAGRANCE JOURNAL, 1996, Vol.24, No.5,<br>pages 77 to 81                                        | 13-19                   |
| X/A       | JP 5-304972 A (UNION INDUSTRIAL Y<br>AGRO-GANADERA S.A.),<br>19 November, 1993 (19.11.93),<br>& EP 484266 A1 & CA 2054409 A<br>& ZA 9108443 A | 13-22/1-12,<br>23,24    |
| X/A       | JP 2003-306690 A (Kabushiki Kaisha Noburu),<br>31 October, 2003 (31.10.03),<br>(Family: none)                                                 | 13-19,22/<br>1-12,23,24 |

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                              |
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                | "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                                                                     |
| "E" earlier application or patent but published on or after the international filing date                                                                               | "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" document member of the same patent family                                                                                                                                                                                                    |
| "O" document referring to an oral disclosure, use, exhibition or other means                                                                                            |                                                                                                                                                                                                                                                  |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |                                                                                                                                                                                                                                                  |

Date of the actual completion of the international search  
09 February, 2005 (09.02.05)

Date of mailing of the international search report  
01 March, 2005 (01.03.05)

Name and mailing address of the ISA/  
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/JP2004/016557

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                       |                       |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                                             | Citation of document, with indication, where appropriate, of the relevant passages                                                                                    | Relevant to claim No. |
| X/A                                                   | JP 11-89513 A (SCIETE DES PRODUITS NESTLE S.A.),<br>06 April, 1999 (06.04.99),<br>& EP 893064 A1 & AU 9877323 A<br>& KR 99013725 A & US 6297279 B1<br>& DE 69718455 E | 13-22/1-12,<br>23,24  |

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/JP2004/016557

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

A matter common between claims 16 and 13 is a vegetable fat composition containing a long-chain highly unsaturated fatty acid. However, it is a known vegetable fat composition as apparent from the fact that it is disclosed in, e.g., JP 2001-226693 A. This matter cannot hence be considered to be a technical feature which contributes to the prior art. Consequently, the two claims do not have a common special technical feature. Therefore, these inventions are not considered to be so linked as to form a single general inventive concept.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

## 国際調査報告

国際出願番号 PCT/JP2004/016557

## A. 発明の属する分野の分類 (国際特許分類 (IPC))

Int. Cl<sup>7</sup> A23L 1/226, A23L 1/22, A23D 9/00

## B. 調査を行った分野

調査を行った最小限資料 (国際特許分類 (IPC))

Int. Cl<sup>7</sup> A23L 1/22~1/23, A23D 9/00

最小限資料以外の資料で調査を行った分野に含まれるもの

国際調査で使用した電子データベース (データベースの名称、調査に使用した用語)

JSTPlus (JOIS)

## C. 関連すると認められる文献

| 引用文献の<br>カテゴリー* | 引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示                                                                               | 関連する<br>請求の範囲の番号           |
|-----------------|-----------------------------------------------------------------------------------------------------------------|----------------------------|
| X               | 加藤 博史、ボラージ油の性状と応用、FRAGRANCE JOURNAL, 1996, 第24巻、第5号、p 77-81                                                     | 13-19                      |
| X/A             | JP 5-304972 A (ユニオン・インドゥストリアル・イ・アグローガ<br>ナデラ・エス・ア) 1993. 11. 19<br>& EP 484266 A1 & CA 2054409 A & ZA 9108443 A | 13-22/1-12, 2<br>3, 24     |
| X/A             | JP 2003-306690 A (株式会社ノーブル) 2003. 10. 31<br>(ファミリーなし)                                                           | 13-19, 22/1-<br>12, 23, 24 |

☒ C欄の続きにも文献が列挙されている。☐ パテントファミリーに関する別紙を参照。

## \* 引用文献のカテゴリー

「A」 特に関連のある文献ではなく、一般的技術水準を示すもの

「E」 国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの

「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す)

「O」 口頭による開示、使用、展示等に言及する文献

「P」 国際出願日前で、かつ優先権の主張の基礎となる出願

の日の後に公表された文献

「T」 国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの

「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの

「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの

「&amp;」 同一パテントファミリー文献

国際調査を完了した日

09. 02. 2005

国際調査報告の発送日

01. 3. 2005

国際調査機関の名称及びあて先

日本国特許庁 (ISA/JP)

郵便番号 100-8915

東京都千代田区霞が関三丁目4番3号

特許庁審査官 (権限のある職員)

鈴木 恵理子

4N

8114

電話番号 03-3581-1101 内線 3448

様式PCT/ISA/210 (第2ページ) (2004年1月)

国際調査報告

国際出願番号 PCT/JP2004/016557

| C (続き) . 関連すると認められる文献 |                                                                                                                                                |                       |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 引用文献の<br>カテゴリー*       | 引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示                                                                                                              | 関連する<br>請求の範囲の番号      |
| X/A                   | JP 11-89513 A (ソシエテ デ プロデュイ ネットスル ソシエテ<br>アノニム) 1999.04.06<br>& EP 893064 A1 & AU 9877323 A & KR 99013725 A<br>& US 6297279 B1 & DE 69718455 E | 13-22/1-12,<br>23, 24 |

様式PCT/ISA/210 (第2ページの続き) (2004年1月)

国際調査報告

国際出願番号 PCT/J P 2004/016557

第II欄 請求の範囲の一部の調査ができないときの意見 (第1ページの2の続き)

法第8条第3項 (PCT 17条(2)(a))の規定により、この国際調査報告は次の理由により請求の範囲の一部について作成しなかった。

1. ☐ 請求の範囲 \_\_\_\_\_ は、この国際調査機関が調査をすることを要しない対象に係るものである。つまり、
2. ☐ 請求の範囲 \_\_\_\_\_ は、有意義な国際調査をすることができる程度まで所定の要件を満たしていない国際出願の部分に係るものである。つまり、
3. ☐ 請求の範囲 \_\_\_\_\_ は、従属請求の範囲であってPCT規則6.4(a)の第2文及び第3文の規定に従って記載されていない。

第III欄 発明の単一性が欠如しているときの意見 (第1ページの3の続き)

次に述べるようにこの国際出願に二以上の発明があるとこの国際調査機関は認めた。

請求の範囲16と13の共通事項は、長鎖高度不飽和脂肪酸を含む植物油脂組成物であるが、例えば、特開2001-226693号公報に記載のように公知の植物油脂組成物であるから、この点を先行技術に対して貢献する技術的特徴とは認められないので、両請求の範囲は特別な技術的特徴を共有するものとはいえず、これらの発明群は単一の一般的発明概念を形成するように関連しているものとは認められない。

1. ☐ 出願人が必要な追加調査手数料をすべて期間内に納付したので、この国際調査報告は、すべての調査可能な請求の範囲について作成した。
2. ☒ 追加調査手数料を要求するまでもなく、すべての調査可能な請求の範囲について調査することができたので、追加調査手数料の納付を求めなかった。
3. ☐ 出願人が必要な追加調査手数料を一部のみしか期間内に納付しなかったので、この国際調査報告は、手数料の納付のあった次の請求の範囲のみについて作成した。
4. ☐ 出願人が必要な追加調査手数料を期間内に納付しなかったので、この国際調査報告は、請求の範囲の最初に記載されている発明に係る次の請求の範囲について作成した。

追加調査手数料の異議の申立てに関する注意

- ☐ 追加調査手数料の納付と共に出願人から異議申立てがあった。
- ☐ 追加調査手数料の納付と共に出願人から異議申立てがなかった。

様式PCT/ISA/210 (第1ページの続葉(2)) (2004年1月)

| Electronic Acknowledgement Receipt   |                                          |
|--------------------------------------|------------------------------------------|
| EFS ID:                              | 31364110                                 |
| Application Number:                  | 14796970                                 |
| International Application Number:    |                                          |
| Confirmation Number:                 | 8501                                     |
| Title of Invention:                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| First Named Inventor/Applicant Name: | Marija Vrljic                            |
| Customer Number:                     | 26191                                    |
| Filer:                               | M. Angela Parsons/Erin Fitzgerald        |
| Filer Authorized By:                 | M. Angela Parsons                        |
| Attorney Docket Number:              | 38767-0010001                            |
| Receipt Date:                        | 29-DEC-2017                              |
| Filing Date:                         | 10-JUL-2015                              |
| Time Stamp:                          | 11:20:17                                 |
| Application Type:                    | Utility under 35 USC 111(a)              |

**Payment information:**

| Submitted with Payment | no                                                 |                 |                                                  |                  |                  |
|------------------------|----------------------------------------------------|-----------------|--------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                                    |                 |                                                  |                  |                  |
| Document Number        | Document Description                               | File Name       | File Size(Bytes)/ Message Digest                 | Multi Part /.zip | Pages (if appl.) |
| 1                      | Information Disclosure Statement (IDS) Form (SB08) | Transmittal.pdf | 69772<br>9316b31c1af037ba810f467611240bebc403b30 | no               | 1                |
| <b>Warnings:</b>       |                                                    |                 |                                                  |                  |                  |

|                                                 |                                                    |                                   |                                                     |    |    |
|-------------------------------------------------|----------------------------------------------------|-----------------------------------|-----------------------------------------------------|----|----|
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| This is not an USPTO supplied IDS fillable form |                                                    |                                   |                                                     |    |    |
| 2                                               | Information Disclosure Statement (IDS) Form (SB08) | 1449.pdf                          | 127007<br>ff963bd9bb958b2336259bb811a0a0c4d69315876 | no | 1  |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| This is not an USPTO supplied IDS fillable form |                                                    |                                   |                                                     |    |    |
| 3                                               | Non Patent Literature                              | Bastide_2011.pdf                  | 905019<br>ff4a929cf2a4a23e2c20a1628257fd542fed1ce   | no | 9  |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| 4                                               | Non Patent Literature                              | Elise_ClassicMeatloaf.pdf         | 296081<br>7feabbfe3878f78cf460aae2f311cc25c28fe4c8  | no | 11 |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| 5                                               | Non Patent Literature                              | GenBank_AAA021681.pdf             | 56356<br>0a6d675ab0b4e57e4d45983bcafb244e258d55e    | no | 1  |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| 6                                               | Foreign Reference                                  | JPS6283842.pdf                    | 930585<br>3ffc799632c7ca550490742ed2a4176e0c11737c  | no | 15 |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| 7                                               | Non Patent Literature                              | PancakeNinja.pdf                  | 114587<br>3e0d39099851dbab27a0a8d8c36f29fe0c7f6b3f  | no | 8  |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |
| <b>Information:</b>                             |                                                    |                                   |                                                     |    |    |
| 8                                               | Non Patent Literature                              | RU_OA_201410481210_2017_05_23.pdf | 656399<br>fb8ba9c589dbb9630fdc39549d01fd0451a137f2  | no | 8  |
| <b>Warnings:</b>                                |                                                    |                                   |                                                     |    |    |

| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                |                                          |    |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------|------------------------------------------|----|----|
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Foreign Reference     | SU291395_partial.pdf           | 160454                                   | no | 1  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                                | 3efae19c3b52d0f364f878e7a4bd592426a048f6 |    |    |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                                |                                          |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                |                                          |    |    |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Non Patent Literature | Topunov_2001_partial_final.pdf | 91064                                    | no | 1  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                                | 584b6194dc32e4ebbbba56c0905eb143bd0d944a |    |    |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                                |                                          |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                |                                          |    |    |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Non Patent Literature | Walter_1993.pdf                | 292489                                   | no | 5  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                                | 647733c90536df1229c2b7e7861a27771a6adf1  |    |    |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                                |                                          |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                |                                          |    |    |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Foreign Reference     | WO2005046354.pdf               | 1365002                                  | no | 27 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                                | e37af993e815c2c58b1c74a1e0bdf47c5baa8401 |    |    |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                       |                                |                                          |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                |                                          |    |    |
| Total Files Size (in bytes):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |                                | 5064815                                  |    |    |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                       |                                |                                          |    |    |

Attorney Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                        |                                          |             |                       |
|------------------------|------------------------------------------|-------------|-----------------------|
| First Named Inventor : | Marija Vrljic                            | Art Unit :  | 1791                  |
| Serial No. :           | 14/796,970                               | Examiner :  | Elizabeth A. Gwartney |
| Filed :                | July 10, 2015                            | Conf. No. : | 8501                  |
| Title :                | METHODS AND COMPOSITIONS FOR CONSUMABLES |             |                       |

**MAIL STOP AMENDMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 Form. Non-patent literature is enclosed; the U.S. patents will be provided upon request. A copy of a Communication from a foreign Patent Office in a counterpart application also is enclosed.

This statement is being filed after a Request for Continued Examination (RCE) and before the mailing of a first Office Action. Therefore, no fees are believed due. If this is incorrect, please apply any charges, or credits, to Deposit Account No. 06-1050, referencing the above-indicated Attorney Docket Number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: /February 8, 2018/

/M. Angela Parsons/  
M. Angela Parsons, Ph.D.  
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61620624.doc

Sheet 1 of 1

|                                                                                                                                                          |                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                          | Applicant<br>Impossible Foods Inc.                         |                                      |                               |
|                                                                                                                                                          | Filing Date<br>July 10, 2015                               | Group Art Unit<br>1791               |                               |

| U.S. Patent Documents |           |                 |                  |               |       |          |                            |
|-----------------------|-----------|-----------------|------------------|---------------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee      | Class | Subclass | Filing Date If Appropriate |
|                       | 1.        | 3,719,499       | 03/06/1973       | Hai et al.    |       |          |                            |
|                       | 2.        | 9,808,029       | 11/07/2017       | Fraser et al. |       |          |                            |
|                       | 3.        | 9,826,772       | 11/28/2017       | Fraser et al. |       |          |                            |
|                       | 4.        | 2018/0027851    | 02/01/2018       | Vrljic et al. |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |             |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|-------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation |    |
|                                                                   |           |                 |                  |                          |       |          | Yes         | No |
|                                                                   | --        | --              | --               | --                       |       |          |             |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                                                                                                                                                                |
|                                                                         | 5.        | DuFosse et al., "Importance of lactones in food flavours," Sciences Des Aliments, 14:17-25 (1994)                                                                                                                                                                                       |
|                                                                         | 6.        | Mercola, "Controversy over fake meat burger," 2011, <a href="https://articles.mercola.com/sites/articles/archive/2017/08/21/impossible-burger-meat-substi...">https://articles.mercola.com/sites/articles/archive/2017/08/21/impossible-burger-meat-substi...</a> (Year: 2011), 9 pages |
|                                                                         | 7.        | Office Action in Japanese Patent Application No. 2015552865, dated October 24, 2017, 15 pages (English Translation)                                                                                                                                                                     |

|                                                                                                                                                                              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Examiner Signature                                                                                                                                                           | Date Considered |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                 |

Substitute Disclosure Form

| Electronic Acknowledgement Receipt          |                                          |
|---------------------------------------------|------------------------------------------|
| <b>EFS ID:</b>                              | 31736639                                 |
| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Shannon Stadnick       |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
| <b>Receipt Date:</b>                        | 08-FEB-2018                              |
| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 12:25:12                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

| Submitted with Payment | no                                                 |                 |                                                   |                  |                  |
|------------------------|----------------------------------------------------|-----------------|---------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                                    |                 |                                                   |                  |                  |
| Document Number        | Document Description                               | File Name       | File Size(Bytes)/ Message Digest                  | Multi Part /.zip | Pages (if appl.) |
| 1                      | Information Disclosure Statement (IDS) Form (SB08) | Transmittal.pdf | 69410<br>adfe3bcba8c49ce1f955253738ca713ec6618fb6 | no               | 1                |
| <b>Warnings:</b>       |                                                    |                 |                                                   |                  |                  |

| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 |                                                    |    |    |
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| This is not an USPTO supplied IDS fillable form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                    |                                 |                                                    |    |    |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Information Disclosure Statement (IDS) Form (SB08) | 1449.pdf                        | 122021<br>607ccca2bb90866d886036c39f60cff02b69467  | no | 1  |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |                                 |                                                    |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 |                                                    |    |    |
| This is not an USPTO supplied IDS fillable form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                    |                                 |                                                    |    |    |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Non Patent Literature                              | DuFosse_1994.pdf                | 926913<br>0d1853b6bb2022dfda62c82329eaf5f0943d77be | no | 34 |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |                                 |                                                    |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 |                                                    |    |    |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Non Patent Literature                              | Mercola_2011.pdf                | 345168<br>67e86b580b6984cf3bf0680070a42dc945003f5c | no | 10 |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |                                 |                                                    |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 |                                                    |    |    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Non Patent Literature                              | JP_OA_2015552865_2017_10_24.pdf | 3312985<br>c4e8f4387c508b6cfd4ee8fb34e57b791d49783 | no | 15 |
| Warnings:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |                                 |                                                    |    |    |
| Information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 |                                                    |    |    |
| Total Files Size (in bytes):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |                                 | 4776497                                            |    |    |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                                                    |                                 |                                                    |    |    |

Doc Code: ECOMM.AUTH/ECOMM.WTDW

Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

|                                                                                                                                           |                         |                       |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|
| <b>AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS</b> | Application No.         | 14/796,970            |
|                                                                                                                                           | Filing Date             | July 10, 2015         |
|                                                                                                                                           | First Named Inventor    | Marija Vrljic         |
|                                                                                                                                           | Art Unit                | 1791                  |
|                                                                                                                                           | Examiner Name           | Elizabeth A. Gwartney |
|                                                                                                                                           | Practitioner Docket No. | 38767-0010001         |

To: Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**I. To authorize permission for Internet Communications.**

☒ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

**II. To withdraw authorization for Internet Communications.**

☐ The authorization given on \_\_\_\_\_, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 44,282.

☐ attorney or agent acting under 37 CFR 1.34. Registration number \_\_\_\_\_.

/M. Angela Parsons/  
Signature

3/12/2018  
Date

M. Angela Parsons Ph.D.  
Typed or printed name

(612) 335-5070  
Telephone Number

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below\*.

☐ \* Total of \_\_\_\_\_ forms are submitted.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Electronic Acknowledgement Receipt          |                                          |
|---------------------------------------------|------------------------------------------|
| <b>EFS ID:</b>                              | 32028547                                 |
| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Judith Witzel          |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
| <b>Receipt Date:</b>                        | 12-MAR-2018                              |
| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 17:49:16                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

| Submitted with Payment | no                                 |            |                                                     |                  |                  |
|------------------------|------------------------------------|------------|-----------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                    |            |                                                     |                  |                  |
| Document Number        | Document Description               | File Name  | File Size(Bytes)/ Message Digest                    | Multi Part /.zip | Pages (if appl.) |
| 1                      | Internet Communications Authorized | sb0439.pdf | 1563557<br>94c0434812ac057d6b7572ee45c6349dcb16ba07 | no               | 2                |
| <b>Warnings:</b>       |                                    |            |                                                     |                  |                  |

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| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1563557 |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |         |

|                                          |                                       |                                                             |             |
|------------------------------------------|---------------------------------------|-------------------------------------------------------------|-------------|
| <b><i>Notice of References Cited</i></b> | Application/Control No.<br>14/796,970 | Applicant(s)/Patent Under<br>Reexamination<br>Vrljic et al. |             |
|                                          | Examiner<br>ELIZABETH A GWARTNEY      | Art Unit<br>1791                                            | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name           | CPC Classification | US Classification |
|---|---|--------------------------------------------------|-----------------|----------------|--------------------|-------------------|
| * | A | US-20170105438-A1                                | 04-2017         | Ajami; Dariush | A23L13/00          | 1/1               |
|   | B |                                                  |                 |                |                    |                   |
|   | C |                                                  |                 |                |                    |                   |
|   | D |                                                  |                 |                |                    |                   |
|   | E |                                                  |                 |                |                    |                   |
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|   | K |                                                  |                 |                |                    |                   |
|   | L |                                                  |                 |                |                    |                   |
|   | M |                                                  |                 |                |                    |                   |

**FOREIGN PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | CPC Classification |
|---|---|--------------------------------------------------|-----------------|---------|------|--------------------|
|   | N |                                                  |                 |         |      |                    |
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|   | P |                                                  |                 |         |      |                    |
|   | Q |                                                  |                 |         |      |                    |
|   | R |                                                  |                 |         |      |                    |
|   | S |                                                  |                 |         |      |                    |
|   | T |                                                  |                 |         |      |                    |

**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|-------------------------------------------------------------------------------------------|
|   | U |                                                                                           |
|   | V |                                                                                           |
|   | W |                                                                                           |
|   | X |                                                                                           |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Receipt date: 12/29/2017

Sheet 1 of 1

|                                                                                                                                                                                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                                                                                            | Applicant<br>Impossible Foods Inc.   |                               |
|                                                                                                                                                                                                                            | Filing Date<br>July 10, 2015         | Group Art Unit<br>1791        |

| U.S. Patent Documents |           |                 |                  |          |       |          |                            |
|-----------------------|-----------|-----------------|------------------|----------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee | Class | Subclass | Filing Date If Appropriate |
|                       | --        | --              | --               | --       |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |                        |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation            |    |
|                                                                   |           |                 |                  |                          |       |          | Yes                    | No |
| /E.G./                                                            | 1.        | JP S6283842     | 04/17/1987       | JAPAN                    |       |          | English Trans          |    |
| /E.G./                                                            | 2.        | SU 291395       | 06/01/1971       | USSR                     |       |          | Partial English Trans. |    |
| /E.G./                                                            | 3.        | WO 2005/046354  | 05/26/2005       | WIPO                     |       |          | English Abst.          |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                                                                                                                                                                                            |
| /E.G./                                                                  | 4.        | Bastide et al., "Heme Iron from Meat and Risk of Colorectal Cancer: A Meta-analysis and a Review of the Mechanisms Involved," Cancer Prevention Research, 2011, Vol. 4, pp 177-184                                                                                                                                  |
| /E.G./                                                                  | 5.        | "Elise, "Classic Meatloaf Recipe,"" Simply Recipes, 2009, <a href="https://web.archive.org/web/20090518183257/http://www.simplyrecipes.com/recipes/classic-meatloaff">https://web.archive.org/web/20090518183257/http://www.simplyrecipes.com/recipes/classic-meatloaff</a> , downloaded 22 November 2017, 11 pages |
| /E.G./                                                                  | 6.        | GenBank Accession No. AAA02168.1, May 21, 1993, 1 page                                                                                                                                                                                                                                                              |
| /E.G./                                                                  | 7.        | Office Action in Russian Patent Application No. 2014104812, dated May 23, 2017, 8 pages (English Translation)                                                                                                                                                                                                       |
| /E.G./                                                                  | 8.        | PancakeNinja, "Beef and chicken cheese burgers" — Pancake Ninja, 2011, <a href="http://pancake-ninja.blogspot.com/2011/06/beef-and-chicken-cheese-burgers.html">http://pancake-ninja.blogspot.com/2011/06/beef-and-chicken-cheese-burgers.html</a> , downloaded 22 November 2017, 8 pages                           |
| /E.G./                                                                  | 9.        | Topunov, AF, et al., "Hemoglobins: Evolution, Abundance, and Heterogeneity," Uspekhi Biologicheskoi Khimii, vol. 41, 2001, page 207 (partial English translation, 1 page)                                                                                                                                           |
| /E.G./                                                                  | 10.       | Walter et al, "Effect of bovine-hemoglobin-fortified cookies on iron status of schoolchildren: a nationwide program in Child," Am J Clin Nutr, 1993, 57, pp. 190-194.                                                                                                                                               |

|                                                                                                                                                                              |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Examiner Signature<br>/ELIZABETH GWARTNEY/                                                                                                                                   | Date Considered<br>03/13/2018 |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                               |

Substitute Disclosure Form

Receipt date: 02/08/2018

Sheet 1 of 1

|                                                                                                                                                                                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                                                                                            | Applicant<br>Impossible Foods Inc.   |                               |
|                                                                                                                                                                                                                            | Filing Date<br>July 10, 2015         | Group Art Unit<br>1791        |

| U.S. Patent Documents |           |                 |                  |               |       |          |                            |
|-----------------------|-----------|-----------------|------------------|---------------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee      | Class | Subclass | Filing Date If Appropriate |
| /E.G./                | 1.        | 3,719,499       | 03/06/1973       | Hai et al.    |       |          |                            |
| /E.G./                | 2.        | 9,808,029       | 11/07/2017       | Fraser et al. |       |          |                            |
| /E.G./                | 3.        | 9,826,772       | 11/28/2017       | Fraser et al. |       |          |                            |
| /E.G./                | 4.        | 2018/0027851    | 02/01/2018       | Vrljic et al. |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |             |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|-------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation |    |
|                                                                   |           |                 |                  |                          |       |          | Yes         | No |
|                                                                   | --        | --              | --               | --                       |       |          |             |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                                                                                                                                                                |
| /E.G./                                                                  | 5.        | DuFosse et al., "Importance of lactones in food flavours," Sciences Des Aliments, 14:17-25 (1994)                                                                                                                                                                                       |
| /E.G./                                                                  | 6.        | Mercola, "Controversy over fake meat burger," 2011, <a href="https://articles.mercola.com/sites/articles/archive/2017/08/21/impossible-burger-meat-substi...">https://articles.mercola.com/sites/articles/archive/2017/08/21/impossible-burger-meat-substi...</a> (Year: 2011), 9 pages |
| /E.G./                                                                  | 7.        | Office Action in Japanese Patent Application No. 2015552865, dated October 24, 2017, 15 pages (English Translation)                                                                                                                                                                     |

|                                                                                                                                                                              |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Examiner Signature<br><br>/ELIZABETH GWARTNEY/                                                                                                                               | Date Considered<br>03/13/2018 |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                               |

Substitute Disclosure Form

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|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b><i>Search Notes</i></b><br> | <b>Application/Control No.</b><br>14/796,970 | <b>Applicant(s)/Patent Under Reexamination</b><br>Vrljic et al. |
|                                                                                                                 | <b>Examiner</b><br>ELIZABETH A GWARTNEY      | <b>Art Unit</b><br>1791                                         |

| CPC - Searched*                |           |          |
|--------------------------------|-----------|----------|
| Symbol                         | Date      | Examiner |
| A23L1/31427                    | 9/10/2015 | EG       |
| A23L13/424, 426 (text limited) | 4/11/2017 | EG       |

| CPC Combination Sets - Searched* |      |          |
|----------------------------------|------|----------|
| Symbol                           | Date | Examiner |
|                                  |      |          |

| US Classification - Searched* |          |      |          |
|-------------------------------|----------|------|----------|
| Class                         | Subclass | Date | Examiner |
|                               |          |      |          |

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

| Search Notes                                                                                                                       |           |          |
|------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|
| Search Notes                                                                                                                       | Date      | Examiner |
| PALM inventor search completed                                                                                                     | 9/9/2015  | EG       |
| EAST text search - see search history                                                                                              | 9/9/2015  | EG       |
| Google search / Google Scholar search - beef, chicken, pork and fish stew; heme-containing proteins from bacteria/ and in general. | 9/10/2015 | EG       |
| EAST text search updated - see search history                                                                                      | 2/21/2016 | EG       |
| Google search updated -                                                                                                            | 2/21/2016 | EG       |
| EAST text search - see search history                                                                                              | 7/7/2016  | EG       |
| Google/Google Scholar - heme protein and meat flavor, hemoglobin and meat flavor                                                   | 7/7/2016  | EG       |
| Google/Google Scholar search - sugar/amino acid and maillard rxn related to meat flavor                                            | 4/10/2017 | EG       |
| A23L13/424, 426 (text limited)                                                                                                     | 4/11/2017 | EG       |

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|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------|
| <p><b><i>Search Notes</i></b></p>  | <p><b>Application/Control No.</b></p> <p>14/796,970</p> | <p><b>Applicant(s)/Patent Under Reexamination</b></p> <p>Vrljic et al.</p> |
|                                                                                                                     | <p><b>Examiner</b></p> <p>ELIZABETH A GWARTNEY</p>      | <p><b>Art Unit</b></p> <p>1791</p>                                         |

| Interference Search |                         |            |          |
|---------------------|-------------------------|------------|----------|
| US Class/CPC Symbol | US Subclass/CPC Group   | Date       | Examiner |
| A23L13              | 424, 426 (text limited) | 03/13/2018 | EG       |
| A23L27              | 26                      | 03/13/2018 | EG       |

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Receipt date: 10/17/2017

Sheet 1 of 3

|                                                                                                                                                                                                                            |                                             |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|                                                                                                                                                                                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit<br><b>1791</b>        |

| U.S. Patent Documents |           |                 |                  |                    |       |          |                            |
|-----------------------|-----------|-----------------|------------------|--------------------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee           | Class | Subclass | Filing Date If Appropriate |
| /E.G./                | 1.        | 2002/0034570    | 3/21/2002        | Krammer et al.     |       |          |                            |
| /E.G./                | 2.        | 2003/0212281    | 11/13/2003       | Sinha et al.       |       |          |                            |
| /E.G./                | 3.        | 2006/0204644    | 9/14/2006        | Cavallini et al.   |       |          |                            |
| /E.G./                | 4.        | 2008/0254199    | 10/16/2008       | Orcutt et al.      |       |          |                            |
| /E.G./                | 5.        | 2010/0196575    | 8/5/2010         | Sanchez            |       |          |                            |
| /E.G./                | 6.        | 2010/0310738    | 12/9/2010        | Ludwig             |       |          |                            |
| /E.G./                | 7.        | 2015/0296834    | 10/22/2015       | Geistlinger et al. |       |          |                            |
| /E.G./                | 8.        | 2015/0296835    | 10/22/2015       | Anderson et al.    |       |          |                            |
| /E.G./                | 9.        | 5,597,594       | 1/28/1997        | Matsuura et al.    |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |                     |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|---------------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation         |    |
|                                                                   |           |                 |                  |                          |       |          | Yes                 | No |
| /E.G./                                                            | 10.       | CN 101156632    | 4/9/2008         | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 11.       | CN 101489422    | 7/22/2009        | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 12.       | CN 101861895    | 10/20/2010       | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 13.       | CN 101897418    | 12/1/2010        | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 14.       | CN 102440302    | 5/9/2012         | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 15.       | CN 102578544    | 7/18/2012        | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 16.       | CN 102835460    | 12/26/2012       | CHINA                    |       |          | English Ab.         |    |
| /E.G./                                                            | 17.       | JP S53115846    | 10/9/1978        | JAPAN                    |       |          | Machine Translation |    |
| /E.G./                                                            | 18.       | JP H08140627    | 6/4/1996         | JAPAN                    |       |          | English Ab.         |    |
| /E.G./                                                            | 19.       | JP 2012016336   | 1/26/2012        | JAPAN                    |       |          | English Ab.         |    |
| /E.G./                                                            | 20.       | WO 2013/013292  | 1/31/2013        | WIPO                     |       |          |                     |    |
| /E.G./                                                            | 21.       | WO 2014/110540  | 7/17/2014        | WIPO                     |       |          |                     |    |
| /E.G./                                                            | 22.       | WO 2015/127388  | 8/27/2015        | WIPO                     |       |          |                     |    |

|                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            | Date Considered<br><b>03/13/2018</b> |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                                      |

Substitute Disclosure Form

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Sheet 2 of 3

|                                                                                                                        |                                                            |                                      |                               |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form                                                                                             | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) |                                                            | Applicant<br>Impossible Foods Inc.   |                               |
|                                                                                                                        |                                                            | Filing Date<br>July 10, 2015         | Group Art Unit<br>1791        |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                             |
|-------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                    |
| /E.G./                                                                  | 23.       | Australian Patent Examination Report No. 1 in Australian Application No. 2012281064, dated January 25, 2016, 5 pages                        |
| /E.G./                                                                  | 24.       | Australian Patent Examination Report No. 1 in Australian Application No. 2012281069, dated September 25, 2015, 5 pages                      |
| /E.G./                                                                  | 25.       | Field et al., "Heme Pigment Content of Bovine Hemopoietic Marrow and Muscle," J. Food Sci., 45:1109-1112, 1980                              |
| /E.G./                                                                  | 26.       | Griffiths, "XCIII. The Action of Gastic Juice on Beef Muscle-Globulin, With References to Anaemia," Biochemistry Journal, 28:671-675 (1934) |
| /E.G./                                                                  | 27.       | International Preliminary Report on Patentability in International Application No. PCT/US 2012/046560, mailed 1/23/2014, 12 pages           |
| /E.G./                                                                  | 28.       | International Preliminary Report on Patentability in International Application No. PCT/US 2012/46552, mailed 1/23/2014, 9 pages             |
| /E.G./                                                                  | 29.       | International Preliminary Report on Patentability in International Application No. PCT/US14/11347, dated July 14, 2015, 10 pages            |
| /E.G./                                                                  | 30.       | International Preliminary Report on Patentability in International Application No. PCT/US14/11362, dated July 23, 2015, 10 pages            |
| /E.G./                                                                  | 31.       | International Search Report and Written Opinion in International Application No. PCT/US 2012/046560, mailed 12/14/2012, 11 pages            |
| /E.G./                                                                  | 32.       | International Search Report and Written Opinion in International Application No. PCT/US 2012/46552, mailed 11/19/2012, 12 pages             |
| /E.G./                                                                  | 33.       | International Search Report and Written Opinion in International Application No. PCT/US14/11347, dated July 3, 2014, 20 pages               |
| /E.G./                                                                  | 34.       | International Search Report and Written Opinion in International Application No. PCT/US14/11362, dated June 13, 2014, 19 pages              |
| /E.G./                                                                  | 35.       | International Search Report and Written Opinion in International Application No. PCT/US2015/017147, dated May 01, 2015, 15 pages            |
| /E.G./                                                                  | 36.       | International Search Report and Written Opinion in International Application No. PCT/US2015/023679, dated August 28, 2015, 26 pages         |
| /E.G./                                                                  | 37.       | Koutsidis et al., "Water-soluble precursors of beef flavor: I. Effect of diet and breed," Meat Science, 79:124-130, 2008                    |
| /E.G./                                                                  | 38.       | Naike, "Food Flavor Chemistry," 1st Edition China Light Industry Press, pages 236-243 (1996) (English Translation)                          |
| /E.G./                                                                  | 39.       | Office Action in Chinese Application No. 201480014349.9, dated July 24, 2017, 52 pages (English Translation)                                |
| /E.G./                                                                  | 40.       | Office Action in Chinese Application No. 201280041713.1, dated July 13, 2017, 28 pages (English Translation)                                |
| /E.G./                                                                  | 41.       | Office Action in Chinese Application No. 201480013778.4, dated August 08, 2017, 24 pages (English Translation)                              |
| /E.G./                                                                  | 42.       | Shimbayashi et al., "Free Amino Acids and Phosphorylethanolamine in Milk Whey of Cow" Agr. Biol. Chem, 29(1):13-19, 1965                    |
| /E.G./                                                                  | 43.       | Tong et al., "Blood Composition of Different Beef Breed Types" Can. J. Anim. Sci, 66:915-924 (December 1986)                                |

|                                            |                               |
|--------------------------------------------|-------------------------------|
| Examiner Signature<br>/ELIZABETH GWARTNEY/ | Date Considered<br>03/13/2018 |
|--------------------------------------------|-------------------------------|

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Disclosure Form

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Sheet 3 of 3

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| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|                                                                                                                                                                                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit<br><b>1791</b>        |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                                                                                            |
|-------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                                                                                   |
| /E.G./                                                                  | 44.       | Xiaoling, "Practical Technology and Quality Management of Deep Processing of Meat Products," China Textile & Apparel Press, pages 9 and 10 (English Translation), 10 pages |

|                                                                                                                                                                              |                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Examiner Signature<br><br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                        | Date Considered<br><br><b>03/13/2018</b> |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                                          |

Substitute Disclosure Form

## EAST Search History

## EAST Search History

## EAST Search History (Prior Art)

| Ref # | Hits  | Search Query                                                      | DBs                                                      | Default Operator | Plurals | Time Stamp       |
|-------|-------|-------------------------------------------------------------------|----------------------------------------------------------|------------------|---------|------------------|
| S1    | 705   | ((heme ADJ protein) OR myoglobin OR hemoglobin) WITH meat         | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2015/09/10 10:54 |
| S2    | 128   | ((heme ADJ protein) OR myoglobin OR hemoglobin) WITH heterologous | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2015/09/10 10:54 |
| S3    | 6     | "8927490"                                                         | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2015/09/10 12:05 |
| S4    | 1131  | A23L1/31427                                                       | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2015/09/10 12:18 |
| S5    | 0     | "14796970"                                                        | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2015/09/10 12:25 |
| S8    | 4     | "20100074998"                                                     | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/19 09:21 |
| S9    | 12709 | vegetable ADJ protein                                             | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/19 12:50 |
| S10   | 434   | (vegetable ADJ protein) AND legume                                | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/19 12:50 |
| S11   | 353   | (meat) WITH (substitute OR replica) WITH (soy OR pea)             | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/21 09:49 |
| S12   | 2032  | (meat) WITH (substitute OR replica)                               | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/21 09:50 |
| S13   | 7     | (meat ADJ replica)                                                | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/21 09:50 |
| S14   | 806   | (meat ADJ substitute)                                             | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR               | OFF     | 2016/02/21 09:50 |
|       |       |                                                                   |                                                          |                  |         |                  |

## EAST Search History

|     |      |                                                          |                                                                   |    |     |                     |
|-----|------|----------------------------------------------------------|-------------------------------------------------------------------|----|-----|---------------------|
| S15 | 34   | (meat ADJ substitute) WITH (soy ADJ protein)             | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/02/21<br>10:25 |
| S16 | 1079 | Hseih                                                    | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/02/21<br>10:28 |
| S17 | 4    | "20120093994"                                            | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/02/21<br>11:16 |
| S18 | 1    | "14796970"                                               | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/03/09<br>14:59 |
| S19 | 4    | "20120093994"                                            | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/03/09<br>15:30 |
| S20 | 98   | (meat ADJ (substitute OR analog)) WITH (soy ADJ protein) | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/03/10<br>15:36 |
| S21 | 17   | leghemoglobin WITH iron                                  | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/06<br>14:58 |
| S22 | 1    | "14796970"                                               | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>08:51 |
| S23 | 16   | hemoglobin AND (beef ADJ flavor)                         | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>09:07 |
| S24 | 0    | hemoglobin WITH (beef ADJ flavor)                        | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>09:10 |
| S25 | 0    | hemoglobin NEAR (beef ADJ flavor)                        | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>09:10 |
| S26 | 0    | leghemoglobin NEAR (beef ADJ flavor)                     | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>09:10 |
| S27 | 0    | globin NEAR (beef ADJ flavor)                            | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>09:10 |
| S28 | 9    | "9011949"                                                | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2016/07/07<br>12:57 |
| S29 | 4    | "20120093994"                                            | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;            | OR | OFF | 2017/04/10<br>13:15 |

## EAST Search History

|     |      |                                                                                |                                                                   |    |     |                     |
|-----|------|--------------------------------------------------------------------------------|-------------------------------------------------------------------|----|-----|---------------------|
|     |      |                                                                                | IBM_TDB                                                           |    |     |                     |
| S30 | 14   | A23L1/31427                                                                    | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:53 |
| S31 | 0    | A23L5/00 WITH meat                                                             | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:54 |
| S32 | 278  | A23L5/00 AND meat                                                              | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:54 |
| S33 | 2070 | A23L13/426                                                                     | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:56 |
| S34 | 13   | A23L13/426 AND (heme OR<br>iron)                                               | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:56 |
| S35 | 1185 | A23L13/424                                                                     | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:57 |
| S36 | 11   | A23L13/424 AND heme                                                            | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:57 |
| S37 | 2508 | A23L27/26                                                                      | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:57 |
| S38 | 1    | A23L27/26 AND heme                                                             | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>08:57 |
| S39 | 1    | "14796970"                                                                     | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/04/11<br>09:37 |
| S40 | 9    | "15786776"                                                                     | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/21<br>12:13 |
| S41 | 1327 | A23L13/42.cpc.                                                                 | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/21<br>14:25 |
| S42 | 6    | A23L13/42.cpc. AND heme                                                        | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/21<br>14:25 |
| S43 | 652  | (hemoglobin OR<br>legghemoglobin) WITH (meat<br>OR chicken OR beef OR<br>pork) | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/21<br>16:29 |
| S44 | 7    | A23L27/26 AND heme                                                             | US-PGPUB; USPAT;                                                  | OR | OFF | 2017/11/22          |

## EAST Search History

|     |     |            |                                                                   |    |     |                     |
|-----|-----|------------|-------------------------------------------------------------------|----|-----|---------------------|
|     |     |            | USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB                     |    |     | 11:28               |
| S45 | 116 | "4968487"  | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/22<br>12:37 |
| S46 | 2   | "15648088" | US-PGPUB; USPAT;<br>USOCR; FPRS; EPO;<br>JPO; DERWENT;<br>IBM_TDB | OR | OFF | 2017/11/22<br>14:50 |

## EAST Search History (Interference)

| Ref # | Hits | Search Query                             | DBs                | Default Operator | Plurals | Time Stamp          |
|-------|------|------------------------------------------|--------------------|------------------|---------|---------------------|
| L1    | 6    | A23L27/26                                | USPAT              | OR               | OFF     | 2018/03/13<br>10:23 |
| L2    | 12   | A23L27/26                                | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:24 |
| L3    | 179  | A23L27/26.cpc.                           | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:24 |
| L4    | 10   | A23L27/26.cpc. AND heme                  | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:24 |
| L5    | 497  | A23L13/426.cpc.                          | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:25 |
| L6    | 14   | A23L13/426.cpc. AND heme                 | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:25 |
| L7    | 15   | A23L13/424.cpc. AND heme                 | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:28 |
| L8    | 5    | ("no animal products").clm.              | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/13<br>10:29 |
| S6    | 0    | "14796970"                               | USPAT              | OR               | OFF     | 2015/09/10<br>12:25 |
| S7    | 0    | "14796970"                               | US-PGPUB;<br>USPAT | OR               | OFF     | 2015/09/10<br>12:26 |
| S47   | 0    | A23L17/26                                | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:07 |
| S48   | 12   | A23L27/26                                | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:08 |
| S49   | 18   | A23L13/426                               | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:11 |
| S50   | 12   | A23L13/424                               | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:13 |
| S51   | 1    | (beef-like ADJ flavor).clm.              | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:16 |
| S52   | 3374 | (beef WITH ribose WITH<br>cysteine).clm. | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:16 |
| S53   | 0    | (beef WITH ribose WITH<br>cysteine).clm. | US-PGPUB;<br>USPAT | OR               | OFF     | 2018/03/12<br>09:16 |

3/13/2018 11:09:33 AM

C:\Users\egwartney\Documents\EAST\Workspaces\14796970.wsp

EAST Search History



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
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P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

26191 7590 04/04/2018  
FISH & RICHARDSON P.C. (TC)  
PO BOX 1022  
MINNEAPOLIS, MINNESOTA 55440-1022  
UNITED STATES OF AMERICA

EXAMINER

GWARTNEY, ELIZABETH A

ART UNIT PAPER NUMBER

1791

DATE MAILED: 04/04/2018

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

TITLE OF INVENTION: METHODS AND COMPOSITIONS FOR CONSUMABLES

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|-------------|---------------|---------------|---------------------|----------------------|------------------|------------|
| REGULAR     | UNDISCOUNTED  | \$1000        | \$0.00              | \$0.00               | \$1000           | 07/05/2018 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or **Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26191 7590 04/04/2018  
FISH & RICHARDSON P.C. (TC)  
PO BOX 1022  
MINNEAPOLIS, MINNESOTA 55440-1022  
UNITED STATES OF AMERICA

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                    |
|--------------------|
| (Depositor's name) |
| (Signature)        |
| (Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

TITLE OF INVENTION: METHODS AND COMPOSITIONS FOR CONSUMABLES

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|-------------|---------------|---------------|---------------------|----------------------|------------------|------------|
| REGULAR     | UNDISCOUNTED  | \$1000        | \$0.00              | \$0.00               | \$1000           | 07/05/2018 |

| EXAMINER              | ART UNIT | CLASS-SUBCLASS |
|-----------------------|----------|----------------|
| GWARTNEY, ELIZABETH A | 1791     | 426-574000     |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

|   |       |
|---|-------|
| 1 | _____ |
| 2 | _____ |
| 3 | _____ |

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_



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UNITED STATES OF AMERICA

|          |
|----------|
| EXAMINER |
|----------|

GWARTNEY, ELIZABETH A

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1791

DATE MAILED: 04/04/2018

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b) (2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

|                                      |                                         |                                      |                         |
|--------------------------------------|-----------------------------------------|--------------------------------------|-------------------------|
| <b><i>Notice of Allowability</i></b> | <b>Application No.</b><br>14/796,970    | <b>Applicant(s)</b><br>Vrljic et al. |                         |
|                                      | <b>Examiner</b><br>ELIZABETH A GWARTNEY | <b>Art Unit</b><br>1791              | <b>AIA Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE filed 17 October 2017.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-5,7-9,11-12,32-43,45-52 and 56-58. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to **PPHfeedback@uspto.gov**.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
**Certified copies:**  
 a) ☐ All      b) ☐ Some      \*c) ☐ None of the:  
     1. ☐ Certified copies of the priority documents have been received.  
     2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

|                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)<br>2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____.<br>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material _____.<br>4. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment<br>6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance<br>7. <input checked="" type="checkbox"/> Other <u>BIB</u> . |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                         |
|--|---------------------------------------------------------|
|  | /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 |
|--|---------------------------------------------------------|

Application/Control Number: 14/796,970  
Art Unit: 1791

Page 2

***NOTICE OF ALLOWABILITY***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicants' submission filed on 17 October 2017 has been entered.
3. Claims 53-55 are cancelled and claims 56-58 are new.
4. The rejection of **claims 53-55** under 35 U.S.C. 112, second paragraph and **claims 1-5, 7-9, 11, 12, 32-43 and 45-55** under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al. (US 2012/0093994) in view of Proulx et al. ("Iron Bioavailability of Hemoglobin from Soy Root Nodules Using a Caco-2 Cell Culture Model" - J. Agric. Food Chem. 2006, p. 1518-1522) have been withdrawn in light of Applicants amendment and remarks filed 17 October 2017 and the Examiner's Amendment set forth below.
5. **Claims 1-5, 7-9, 11, 12, 32-43, 45-52 and 56-58 are allowed.**

***EXAMINER'S AMENDMENT***

6. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Application/Control Number: 14/796,970  
Art Unit: 1791

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Authorization for this examiner's amendment was given in an interview with Angela Parsons on 2 March 2018.

**The application has been amended as follows:**

**Claim 1:**

A method for imparting a beef-like aroma to a meat replica matrix, wherein the meat replica matrix ~~contains no animal products and~~ comprises one or more plant proteins, a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof, and at least one sulfur compound selected from methionine, cysteine and thiamine, the method comprising

adding 0.01%-5% (by weight of the meat replica matrix) of a non-animal heme-containing protein to the meat replica matrix,

wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma, thereby imparting a beef-like aroma to the meat replica matrix.

**Claim 2:**

The method of claim 1, wherein the non-animal heme-containing protein has an amino acid sequence with at least 70% homology to the amino acid sequence set forth in SEQ ID NO: 1.

**Claim 3:**

The method of claim 1, wherein the non-animal heme-containing protein has a UV-VIS spectrum that is substantially similar to that of myoglobin from an animal.

**Claim 4:**

The method of claim 1, wherein the heme-containing protein is selected from the group consisting of ~~an androglobin, a cytoglobin, a globin E, a globin X, a globin Y, a hemoglobin, a leghemoglobin, a flavohemoglobin, Hell's gate globin I, a myoglobin, an erythrocrucorin, a beta hemoglobin, an alpha hemoglobin, a protoglobin, a cyanoglobin, a cytoglobin, a histoglobin, a neuroglobin, a chlorocruorin, a truncated hemoglobin, a truncated 2/2 globin, and a hemoglobin 3, a cytochrome, and a peroxidase.~~

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**Claim 5:**

The method of claim 1, comprising incorporating into the meat replica matrix 0.4%-1% (by weight of the meat replica matrix ) of the non-animal heme-containing protein.

**Claim 7:**

A method for making a meat replica matrix having a beef-like aroma, wherein the meat replica matrix ~~contains no animal products and~~ comprises one or more plant proteins, a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof, and at least one sulfur compound selected from methionine, cysteine and thiamine, the method comprising obtaining a non-animal heme-containing protein; and incorporating 0.01%-5% (by weight of the meat replica matrix ) of the non-animal heme-containing protein into the meat replica matrix, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma.

**Claim 8:**

The method of claim 7, wherein the non-animal heme-containing protein has an amino acid sequence with at least 70% homology to the amino acid sequence set forth in SEQ ID NO: 1.

**Claim 9:**

The method of claim 7, wherein the non-animal heme-containing protein has a UV-VIS spectrum that is substantially similar to that of myoglobin from an animal.

**Claim 11:**

The method of claim 7, wherein the heme-containing protein is selected from the group consisting of ~~an androglobin, a cytoglobin, a globin E, a globin X, a globin Y, a hemoglobin, a leghemoglobin, a flavohemoglobin, Hell's gate globin I, a myoglobin, an erythrocrucorin, a beta hemoglobin, an alpha hemoglobin, a protoglobin, a cyanoglobin, a cytoglobin, a histoglobin, a neuroglobin,~~ a chlorocruorin, a truncated hemoglobin, a truncated 2/2 globin, and a hemoglobin 3, ~~a cytochrome, and a peroxidase.~~

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**Claim 12:**

The method of claim 7, comprising incorporating 0.4-1% (by weight of the meat replica matrix ) of the non-animal heme-containing protein into the meat replica matrix.

**Claim 32:**

The method of claim 1, wherein the non-animal heme-containing protein is purified.

**Claim 45:**

The method of claim 7, wherein the non-animal heme-containing protein is purified.

**Claim 47:**

A method for making a meat replica matrix having a beef-like aroma, wherein the meat replica matrix ~~contains no animal products and~~ comprises one or more plant proteins, a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof, and at least one sulfur compound selected from methionine, cysteine and thiamine, the method comprising incorporating 0.01%-5% (by weight of the meat replica matrix ) of a non-animal heme-containing protein into the meat replica matrix, wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma.

**Claim 48:**

The method of claim 47, wherein the non-animal heme-containing protein has an amino acid sequence with at least 70% homology to the amino acid sequence set forth in SEQ ID NO: 1.

**Claim 49:**

The method of claim 47, wherein the non-animal heme-containing protein has a UV-VIS spectrum that is substantially similar to that of myoglobin from an animal.

**Claim 50:**

The method of claim 47, wherein the heme-containing protein is selected from the group consisting of ~~an androglobin, a cytoglobin, a globin E, a globin X, a globin Y, a hemoglobin, a~~ leghemoglobin, a flavohemoglobin, Hell's gate globin I, ~~a myoglobin, an erythrocrucorin, a beta~~

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~~hemoglobin, an alpha hemoglobin, a protoglobin, a cyanoglobin, a cytoglobin, a histoglobin, a neuroglobins, a chlorocruorin, a truncated hemoglobin, a truncated 2/2 globin, and a hemoglobin 3, a cytochrome, and a peroxidase.~~

**Claim 51:**

The method of claim 47, comprising incorporating 0.4%-1% (by weight of the meat replica matrix ) of the non-animal heme-containing protein into the meat replica matrix.

***Reasons for Allowance***

**7. The following is an examiner's statement of reasons for allowance:**

The prior art of record, Hseih et al., disclose structured plant protein products having protein fibers that are substantially aligned and having a desirable meat-like moisture, texture, mouthfeel, flavor and color (Abstract, [0013]).

Hseih et al. does not disclose a product comprising: (a) 0.01% -5% by weight of a non-animal heme-containing protein comprising an amino acid sequence having at least 70% sequence identity to the polypeptide set forth in SEQ ID NO:1; (b) compound selected from glucose, ribose, fructose, sucrose, xylose, maltodextrin and combinations thereof; or (c) at least one sulfur compound selected from methionine, cysteine and thiamine.

Proulx et al. teach that the bioavailability hemoglobin from soy root nodules is similar to that of heme iron from animal sources (p. 1521/Results and Discussion). Proulx et al. teach using plant hemoglobin, i.e. leghemoglobin, as a heme iron source in diets that are consumed by humans (p. 1518/Introduction). While Proulx et al. provides motivation to include leghemoglobin in a foodstuff, including a structured plant protein product such as disclosed by Hseih et al, the reference is silent with respect to the influence of heme-containing protein on beef associated flavor.

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Cerny et al. ( “Formation of Aroma Compounds from Ribose and Cysteine during the Maillard Reaction” -/. Agric. Food Chem., 2003, 51, pp. 2714-2721) teach that the Maillard reaction plays a substantial role in flavor generation during the cooking of meat (p. 2714/Introduction). Cerny et al. teach that besides, thiamine, the precursors ribose and cysteine are important for meat aroma and are consequently employed in the product of meat flavors (Abstract, p. 2714/Introduction).

While Cerny et al. disclose that mixtures of ribose and cysteine, when heated, are known to produce flavors associated with meat, Applicants have demonstrated that the combination of: (a) a heme-containing protein b) compound selected from glucose, ribose, fructose, sucrose, xylose, maltodextrin and combinations thereof; and (c) at least one sulfur compound selected from methionine, cysteine and thiamine produces novel (i.e, not produced in the absence of heme-containing protein) volatile compounds associated with a meaty aroma upon heating.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

### ***Correspondence***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIZABETH A GWARTNEY whose telephone number is (571)270-3874. The examiner can normally be reached on M-F: 8 a.m. - 4 p.m..

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald (Larry) Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ELIZABETH A. GWARTNEY  
Primary Examiner  
Art Unit 1791

/ELIZABETH GWARTNEY/  
Primary Examiner, Art Unit 1791

|                                                                                                                  |                                              |                                                                 |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>14/796,970 | <b>Applicant(s)/Patent Under Reexamination</b><br>Vrljic et al. |
|                                                                                                                  | <b>Examiner</b><br>ELIZABETH A GWARTNEY      | <b>Art Unit</b><br>1791                                         |

| CPC    |   |    |   |     |      |            |
|--------|---|----|---|-----|------|------------|
| Symbol |   |    |   |     | Type | Version    |
| A23L   | / | 27 | / | 26  | F    | 2016-08-01 |
| A23L   | / | 13 | / | 424 | I    | 2016-08-01 |
| A23L   | / | 13 | / | 426 | I    | 2016-08-01 |

| CPC Combination Sets |   |      |     |         |         |
|----------------------|---|------|-----|---------|---------|
| Symbol               |   | Type | Set | Ranking | Version |
|                      | / |      |     |         |         |

|                                                         |               |                              |                   |
|---------------------------------------------------------|---------------|------------------------------|-------------------|
| NONE                                                    |               | <b>Total Claims Allowed:</b> |                   |
| (Assistant Examiner)                                    | (Date)        | 33                           |                   |
| /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 | 13 March 2018 | O.G. Print Claim(s)          | O.G. Print Figure |
| (Primary Examiner)                                      | (Date)        | 1                            | 1                 |

|                                                                                                                  |                                              |                                                                 |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>14/796,970 | <b>Applicant(s)/Patent Under Reexamination</b><br>Vrljic et al. |
|                                                                                                                  | <b>Examiner</b><br>ELIZABETH A GWARTNEY      | <b>Art Unit</b><br>1791                                         |

|                                     |   |    |      |
|-------------------------------------|---|----|------|
| <b>INTERNATIONAL CLASSIFICATION</b> |   |    |      |
| <b>CLAIMED</b>                      |   |    |      |
| A23L                                | / | 27 | / 26 |
| <b>NON-CLAIMED</b>                  |   |    |      |
|                                     | / |    | /    |

|                                   |                 |
|-----------------------------------|-----------------|
| <b>US ORIGINAL CLASSIFICATION</b> |                 |
| <b>CLASS</b>                      | <b>SUBCLASS</b> |
|                                   |                 |

|                            |                                          |  |  |  |  |  |
|----------------------------|------------------------------------------|--|--|--|--|--|
| <b>CROSS REFERENCES(S)</b> |                                          |  |  |  |  |  |
| <b>CLASS</b>               | <b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b> |  |  |  |  |  |
|                            |                                          |  |  |  |  |  |

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|---------------------------------------------------------|---------------|------------------------------|-------------------|
| NONE                                                    |               | <b>Total Claims Allowed:</b> |                   |
| (Assistant Examiner)                                    | (Date)        | 33                           |                   |
| /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 | 13 March 2018 | O.G. Print Claim(s)          | O.G. Print Figure |
| (Primary Examiner)                                      | (Date)        | 1                            | 1                 |

|                                                                                                                  |                                              |                                                                 |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b><br>14/796,970 | <b>Applicant(s)/Patent Under Reexamination</b><br>Vrljic et al. |
|                                                                                                                  | <b>Examiner</b><br>ELIZABETH A GWARTNEY      | <b>Art Unit</b><br>1791                                         |

☐ Claims renumbered in the same order as presented by applicant
 ☐ CPA
 ☐ T.D.
 ☐ R.1.47

| CLAIMS |          |       |          |       |          |       |          |       |          |       |          |       |          |       |          |
|--------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|-------|----------|
| Final  | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
| 1      | 1        | -     | 10       | -     | 19       | -     | 28       | 11    | 37       | 25    | 46       | -     | 55       |       |          |
| 2      | 2        | 17    | 11       | -     | 20       | -     | 29       | 12    | 38       | 27    | 47       | 13    | 56       |       |          |
| 3      | 3        | 18    | 12       | -     | 21       | -     | 30       | 19    | 39       | 28    | 48       | 26    | 57       |       |          |
| 4      | 4        | -     | 13       | -     | 22       | -     | 31       | 20    | 40       | 29    | 49       | 33    | 58       |       |          |
| 5      | 5        | -     | 14       | -     | 23       | 6     | 32       | 21    | 41       | 30    | 50       |       |          |       |          |
| -      | 6        | -     | 15       | -     | 24       | 7     | 33       | 22    | 42       | 31    | 51       |       |          |       |          |
| 14     | 7        | -     | 16       | -     | 25       | 8     | 34       | 23    | 43       | 32    | 52       |       |          |       |          |
| 15     | 8        | -     | 17       | -     | 26       | 9     | 35       | -     | 44       | -     | 53       |       |          |       |          |
| 16     | 9        | -     | 18       | -     | 27       | 10    | 36       | 24    | 45       | -     | 54       |       |          |       |          |

|                                                         |               |                              |                   |
|---------------------------------------------------------|---------------|------------------------------|-------------------|
| NONE                                                    |               | <b>Total Claims Allowed:</b> |                   |
| (Assistant Examiner)                                    | (Date)        | 33                           |                   |
| /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 | 13 March 2018 | O.G. Print Claim(s)          | O.G. Print Figure |
| (Primary Examiner)                                      | (Date)        | 1                            | 1                 |



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## BIB DATA SHEET

CONFIRMATION NO. 8501

| SERIAL NUMBER                                                                                                                                                                                                                                                                                                                 | FILING or 371(c)<br>DATE                                                                                          | CLASS                                                        | GROUP ART UNIT          | ATTORNEY DOCKET<br>NO. |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------|------------------------|
| 14/796,970                                                                                                                                                                                                                                                                                                                    | 07/10/2015                                                                                                        | 426                                                          | 1791                    | 38767-0010001          |
| <b>APPLICANTS</b><br>Impossible Foods Inc., Redwood City, CA                                                                                                                                                                                                                                                                  |                                                                                                                   |                                                              |                         |                        |
| <b>INVENTORS</b><br>Marija Vrljic, San Mateo, CA;<br>Sergey Solomatin, Mountain View, CA;<br>Rachel Fraser, San Francisco, CA;<br>Patrick O'Reilly Brown, Stanford, CA;<br>Jessica Karr, San Francisco, CA;<br>Celeste Holz-Schietinger, East Palo Alto, CA;<br>Michael Eisen, Berkeley, CA;<br>Ranjani Varadan, Fremont, CA; |                                                                                                                   |                                                              |                         |                        |
| <b>** CONTINUING DATA *****</b><br>This application is a CON of PCT/US2014/011361 01/13/2014<br>which is a CON of 13/941,211 07/12/2013<br>and claims benefit of 61/908,634 11/25/2013<br>and claims benefit of 61/751,816 01/11/2013                                                                                         |                                                                                                                   |                                                              |                         |                        |
| <b>** FOREIGN APPLICATIONS *****</b>                                                                                                                                                                                                                                                                                          |                                                                                                                   |                                                              |                         |                        |
| <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b><br>07/21/2015                                                                                                                                                                                                                                                        |                                                                                                                   |                                                              |                         |                        |
| Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Verified and // <input type="checkbox"/> Met after Allowance<br>Acknowledged Examiner's Signature Initials              |                                                                                                                   | STATE OR<br>COUNTRY<br>CA                                    | SHEETS<br>DRAWINGS<br>9 | TOTAL<br>CLAIMS<br>30  |
| INDEPENDENT<br>CLAIMS<br>4                                                                                                                                                                                                                                                                                                    |                                                                                                                   |                                                              |                         |                        |
| <b>ADDRESS</b><br>FISH & RICHARDSON P.C. (TC)<br>PO BOX 1022<br>MINNEAPOLIS, MN 55440-1022<br>UNITED STATES                                                                                                                                                                                                                   |                                                                                                                   |                                                              |                         |                        |
| <b>TITLE</b><br>METHODS AND COMPOSITIONS FOR CONSUMABLES                                                                                                                                                                                                                                                                      |                                                                                                                   |                                                              |                         |                        |
| <b>FILING FEE<br/>RECEIVED</b><br>3600                                                                                                                                                                                                                                                                                        | FEES: Authority has been given in Paper<br>No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: | <input type="checkbox"/> All Fees                            |                         |                        |
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                   | <input type="checkbox"/> 1.16 Fees (Filing)                  |                         |                        |
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                   | <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) |                         |                        |
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                   | <input type="checkbox"/> 1.18 Fees (Issue)                   |                         |                        |
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                   | <input type="checkbox"/> Other _____                         |                         |                        |
|                                                                                                                                                                                                                                                                                                                               |                                                                                                                   | <input type="checkbox"/> Credit                              |                         |                        |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------|-------------------------|
| <b><i>Examiner-Initiated Interview Summary</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Application No.</b><br>14/796,970    | <b>Applicant(s)</b><br>Vrjic et al.                     |                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Examiner</b><br>ELIZABETH A GWARTNEY | <b>Art Unit</b><br>1791                                 | <b>AIA Status</b><br>No |
| All participants (applicant, applicant's representative, PTO personnel):<br><br><div style="display: flex; justify-content: space-between;"> <span>(1) ELIZABETH A. GWARTNEY.</span> <span>(3) ____.</span> </div><br><div style="display: flex; justify-content: space-between;"> <span>(2) Ms. Angela Parsons.</span> <span>(4) ____.</span> </div><br>Date of Interview: <u>02 March 2018.</u><br><br>Type: <input checked="" type="checkbox"/> Telephonic <input type="checkbox"/> Video Conference<br><input type="checkbox"/> Personal [copy given to: <input type="checkbox"/> applicant <input type="checkbox"/> applicant's representative]<br><br>Exhibit shown or demonstration conducted: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No.<br>If Yes, brief description: _____.<br><br>Issues Discussed <input type="checkbox"/> 101 <input type="checkbox"/> 112 <input type="checkbox"/> 102 <input type="checkbox"/> 103 <input checked="" type="checkbox"/> Others<br><small>(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)</small><br><br>Claim(s) discussed: <u>1,4,7,11,47 and 50.</u><br><br>Identification of prior art discussed: <u>None.</u><br><br>Substance of Interview<br><small>(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)</small><br><br><u>See Continuation Sheet.</u> |                                         |                                                         |                         |
| <p><b>Applicant recordation instructions:</b> It is not necessary for applicant to provide a separate record of the substance of interview.</p> <p><b>Examiner recordation instructions:</b> Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.</p> <p><input type="checkbox"/> Attachment</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                         |                                                         |                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                         | /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 |                         |

Continuation Sheet (PTOL-413B)

Application No. 14/796,970

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: In the interview, the Examiner suggested claim amendments to clarify the independent claims, 1, 7 and 47. The independent claims (amended) will specifically be directed to methods of imparting beef-like aroma to a meat replica matrix including a step of adding non-animal heme-containing protein to the meat replica matrix. Ms. Parsons will provide claim amendments via e-mail to be incorporated into an Examiner's Amendment in the Notice of Allowability. Ms. Parsons agreed to the Examiner's Amendment as set forth in the Notice of Allowability.

Receipt date: 11/17/2017

Sheet 1 of 1

|                                                                                                                                                          |                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                          | Applicant<br>Impossible Foods Inc.                         |                                      |                               |
|                                                                                                                                                          | Filing Date<br>July 10, 2015                               | Group Art Unit<br>1791               |                               |

| U.S. Patent Documents |           |                 |                  |                |       |          |                            |
|-----------------------|-----------|-----------------|------------------|----------------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee       | Class | Subclass | Filing Date If Appropriate |
| /E.G./                | 1.        | 2,934,437       | 04/26/1960       | Morton et al.  |       |          |                            |
| /E.G./                | 2.        | 3,394,017       | 07/23/1968       | Giacino et al. |       |          |                            |
| /E.G./                | 3.        | 5,039,543       | 08/13/1991       | Lee et al.     |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |               |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|---------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation   |    |
|                                                                   |           |                 |                  |                          |       |          | Yes           | No |
| /E.G./                                                            | 4.        | EP 0136428      | 04/10/1985       | EPO                      |       |          |               |    |
| /E.G./                                                            | 5.        | EP 2943072      | 11/18/2015       | EPO                      |       |          |               |    |
| /E.G./                                                            | 6.        | JP S42-22194    | 10/31/1942       | JAPAN                    |       |          |               |    |
| /E.G./                                                            | 7.        | JP S49-39824    | 10/29/1974       | JAPAN                    |       |          |               |    |
| /E.G./                                                            | 8.        | JP S51-63971    | 10/24/1975       | JAPAN                    |       |          | Engl. Transl. |    |
| /E.G./                                                            | 9.        | WO 2014/110532  | 07/17/2014       | WIPO                     |       |          |               |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |                                                                                                             |
|-------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------|
| Examiner Initial                                                        | Desig. ID | Document                                                                                                    |
| /E.G./                                                                  | 10.       | Supplementary European Search Report in European Application No. 15774164, dated October 27, 2017, 11 pages |

|                                                                                                                                                                              |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Examiner Signature<br>/ELIZABETH GWARTNEY/                                                                                                                                   | Date Considered<br>03/13/2018 |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                               |

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|-----------------|-------------|----------------------|---------------------|------------------|
| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

|                             |      |            |
|-----------------------------|------|------------|
| 26191                       | 7590 | 04/10/2018 |
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| PO BOX 1022                 |      |            |
| MINNEAPOLIS, MN 55440-1022  |      |            |

|                       |  |
|-----------------------|--|
| EXAMINER              |  |
| GWARTNEY, ELIZABETH A |  |

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
| 1791     |              |

|                   |               |
|-------------------|---------------|
| NOTIFICATION DATE | DELIVERY MODE |
| 04/10/2018        | ELECTRONIC    |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com



## UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

Application No. : 14796970  
Applicant : Vrljic  
Filing Date : 07/10/2015  
Date Mailed : 04/10/2018

### NOTICE TO FILE CORRECTED APPLICATION PAPERS

#### *Notice of Allowance Mailed*

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

**Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.**

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

**See attachment(s).**

*A copy of this notice **MUST** be returned with the reply. Please address response to  
"Mail Stop Issue Fee, Commissioner for Patents,  
P.O. Box 1450, Alexandria, VA 22313-1450".*

/Nran Hem/  
Publication Branch  
Office of Data Management  
(571) 272-4200

Application No. 14796970

Drawings filed: 07/10/2015

**DRAWINGS AND BRIEF DESCRIPTION OF DRAWINGS  
IN NON-COMPLIANCE WITH 37 CFR 1.84(u)(1)**

37 CFR 1.84(u)(1) states, “The different views must be numbered in consecutive Arabic numerals, starting with 1 ... Partial views intended to form one complete view, on one or several sheets, must be identified by the same number followed by a capital letter. View numbers must be preceded by the abbreviation ‘FIG.’ ”

Other methods of identification are improper, including Roman numerals (FIG. I, FIG. II, etc.) and alphabetic characters (FIG. A, FIG. B, etc.). Abbreviations and words other than “FIG.” (“Illustration, 1” “Diagram 2,” “Photo 3,” etc.) are improper.

- ☐ Applicant must submit drawings that number the views using consecutive Arabic numerals.
- ☐ Applicant must amend the brief description of the drawings on Page(s) of the specification to show consecutive Arabic numerals.

NOTE: Applicant is advised that the detailed description may voluntarily be amended to identify the drawings by Arabic numerals.

- ☒ The drawing is continued onto a second page (or more) without proper labeling under 37 CFR 1.84(u)(1). FIG(s) 1
- ☐ Applicant must submit drawings on which the view numbers are preceded by the abbreviation “FIG.”
- ☐ Applicant must amend the brief description of the drawings on Page(s) of the specification to show view numbers preceded by the abbreviation “FIG.”

NOTE: Applicant is advised that the detailed description may voluntarily be amended to show view numbers preceded by the abbreviation “FIG.”



# UNITED STATES PATENT AND TRADEMARK OFFICE

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

|       |      |            |
|-------|------|------------|
| 26191 | 7590 | 04/11/2018 |
|-------|------|------------|

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PO BOX 1022  
MINNEAPOLIS, MINNESOTA 55440-1022  
UNITED STATES OF AMERICA

|                       |  |
|-----------------------|--|
| EXAMINER              |  |
| GWARTNEY, ELIZABETH A |  |

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
| 1791     |              |

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|-------------------|---------------|
| NOTIFICATION DATE | DELIVERY MODE |
| 04/11/2018        | ELECTRONIC    |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

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Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

|                                                |                                         |                                      |                         |
|------------------------------------------------|-----------------------------------------|--------------------------------------|-------------------------|
| <b>Supplemental<br/>Notice of Allowability</b> | <b>Application No.</b><br>14/796,970    | <b>Applicant(s)</b><br>Vrljic et al. |                         |
|                                                | <b>Examiner</b><br>ELIZABETH A GWARTNEY | <b>Art Unit</b><br>1791              | <b>AIA Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE filed 17 October 2017, Printer RUSH 5 April 2018.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-5,7-9,11-12,32-43,45-52 and 56-58 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to **PPHfeedback@uspto.gov**.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
**Certified copies:**  
 a) ☐ All    b) ☐ Some    \*c) ☐ None of the:  
     1. ☐ Certified copies of the priority documents have been received.  
     2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_ .  
     3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* Certified copies not received: \_\_\_\_ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_ .  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

|                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)<br>2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date ____.<br>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material ____.<br>4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. | 5. <input type="checkbox"/> Examiner's Amendment/Comment<br>6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance<br>7. <input checked="" type="checkbox"/> Other <u>XRUSH</u> . |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                         |
|--|---------------------------------------------------------|
|  | /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 |
|--|---------------------------------------------------------|

Receipt date: 09/21/2015

Sheet 1 of 12

|                                                                                                                    |                                                            |                                             |                                      |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| Substitute Disclosure Form                                                                                         | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b)) |                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                    |                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |

| U.S. Patent Documents |           |                 |                  |                  |       |          |                            |
|-----------------------|-----------|-----------------|------------------|------------------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee         | Class | Subclass | Filing Date If Appropriate |
|                       | 1.        | 2001/0024677    | 9/27/2001        | Bringe           |       |          |                            |
|                       | 2.        | 2001/0049132    | 12/6/2001        | Kringelum et al. |       |          |                            |
|                       | 3.        | 2003/0198700    | 10/23/2003       | Gruber           |       |          |                            |
|                       | 4.        | 2003/0224476    | 12/4/2003        | Chou             |       |          |                            |
|                       | 5.        | 2004/0151778    | 8/5/2004         | Richard et al.   |       |          |                            |
|                       | 6.        | 2004/0161513    | 8/19/2004        | Akashe et al.    |       |          |                            |
|                       | 7.        | 2005/0037111    | 2/17/2005        | Berry            |       |          |                            |
|                       | 8.        | 2006/0035003    | 2/16/2006        | McMindes et al.  |       |          |                            |
|                       | 9.        | 2006/0233721    | 10/19/2006       | Tamarkin et al.  |       |          |                            |
|                       | 10.       | 2007/0269567    | 11/22/2007       | McMindes et al.  |       |          |                            |
|                       | 11.       | 2007/0269571    | 11/22/2007       | Akita et al.     |       |          |                            |
|                       | 12.       | 2007/0269583    | 11/22/2007       | McMindes et al.  |       |          |                            |
|                       | 13.       | 2008/0226810    | 9/18/2008        | Passe et al.     |       |          |                            |
|                       | 14.       | 2008/0254168    | 10/16/2008       | Mueller et al.   |       |          |                            |
|                       | 15.       | 2008/0268112    | 10/30/2008       | Rolan et al.     |       |          |                            |
|                       | 16.       | 2008/0292749    | 11/27/2008       | Goodwins et al.  |       |          |                            |
|                       | 17.       | 2008/0299254    | 12/4/2008        | Kim et al.       |       |          |                            |
|                       | 18.       | 2009/0264520    | 10/22/2009       | Bhagat et al.    |       |          |                            |
|                       | 19.       | 2009/0274817    | 11/5/2009        | Yamaguchi et al. |       |          |                            |
|                       | 20.       | 2010/0074998    | 3/25/2010        | Vega et al.      |       |          |                            |
|                       | 21.       | 2010/0136201    | 6/3/2010         | Bigeard et al.   |       |          |                            |
|                       | 22.       | 2010/0233347    | 9/16/2010        | Uhrhan           |       |          |                            |
|                       | 23.       | 2010/0249560    | 9/30/2010        | Levinson et al.  |       |          |                            |
|                       | 24.       | 2010/0281765    | 11/11/2010       | Schwartz         |       |          |                            |
|                       | 25.       | 2010/0311950    | 12/9/2010        | Kugitani         |       |          |                            |
|                       | 26.       | 2011/0008502    | 1/13/2011        | Hosomi et al.    |       |          |                            |
|                       | 27.       | 2011/0064862    | 3/17/2011        | McCready et al   |       |          |                            |

|                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            | Date Considered<br><b>02/18/2016</b> |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                                      |

Substitute Disclosure Form

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.G./

Receipt date: 09/21/2015

Sheet 2 of 12

| Substitute Disclosure Form                                                                                                                                                   |           | U.S. Department of Commerce<br>Patent and Trademark Office |                  | Attorney Docket No.<br><b>38767-0010001</b> |       | Application No.<br><b>14/796,970</b> |                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------|------------------|---------------------------------------------|-------|--------------------------------------|----------------------------|
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b))                                                           |           |                                                            |                  | Applicant<br><b>Impossible Foods Inc.</b>   |       |                                      |                            |
|                                                                                                                                                                              |           |                                                            |                  | Filing Date<br><b>July 10, 2015</b>         |       | Group Art Unit                       |                            |
| <b>U.S. Patent Documents</b>                                                                                                                                                 |           |                                                            |                  |                                             |       |                                      |                            |
| Examiner Initial                                                                                                                                                             | Desig. ID | Document Number                                            | Publication Date | Patentee                                    | Class | Subclass                             | Filing Date If Appropriate |
|                                                                                                                                                                              | 28.       | 2011/0065847                                               | 3/17/2011        | Miwa et al.                                 |       |                                      |                            |
|                                                                                                                                                                              | 29.       | 2011/0081386                                               | 4/7/2011         | Guth et al.                                 |       |                                      |                            |
|                                                                                                                                                                              | 30.       | 2011/0081435                                               | 4/7/2011         | Guth et al.                                 |       |                                      |                            |
|                                                                                                                                                                              | 31.       | 2011/0117180                                               | 5/19/2011        | Yan et al.                                  |       |                                      |                            |
|                                                                                                                                                                              | 32.       | 2011/0286992                                               | 11/24/2012       | Gruber et al.                               |       |                                      |                            |
|                                                                                                                                                                              | 33.       | 2011/0288389                                               | 11/24/2011       | Levinson et al.                             |       |                                      |                            |
|                                                                                                                                                                              | 34.       | 2012/0059150                                               | 3/8/2012         | Moloney et al.                              |       |                                      |                            |
|                                                                                                                                                                              | 35.       | 2012/0093994                                               | 4/19/2012        | Hsieh et al.                                |       |                                      |                            |
|                                                                                                                                                                              | 36.       | 2013/0004617                                               | 1/3/2013         | Zhang et al.                                |       |                                      |                            |
|                                                                                                                                                                              | 37.       | 3,658,550                                                  | 4/25/1972        | Hawley                                      |       |                                      |                            |
|                                                                                                                                                                              | 38.       | 3,693,533                                                  | 9/26/1972        | Liepa                                       |       |                                      |                            |
|                                                                                                                                                                              | 39.       | 3,829,582                                                  | 8/13/1974        | Guadagni et al.                             |       |                                      |                            |
|                                                                                                                                                                              | 40.       | 3,870,801                                                  | 3/11/1975        | Tombs                                       |       |                                      |                            |
|                                                                                                                                                                              | 41.       | 3,973,043                                                  | 8/3/1976         | Lynn                                        |       |                                      |                            |
|                                                                                                                                                                              | 42.       | 3,966,985                                                  | 6/29/1976        | Jonas                                       |       |                                      |                            |
|                                                                                                                                                                              | 43.       | 4,045,587                                                  | 8/30/1977        | Katz et al.                                 |       |                                      |                            |
|                                                                                                                                                                              | 44.       | 4,094,997                                                  | 6/13/1978        | Aishima et al.                              |       |                                      |                            |
|                                                                                                                                                                              | 45.       | 4,218,487                                                  | 8/19/1980        | Jaeggi                                      |       |                                      |                            |
|                                                                                                                                                                              | 46.       | 4,435,438                                                  | 3/6/1984         | Lehnhardt et al.                            |       |                                      |                            |
|                                                                                                                                                                              | 47.       | 4,604,290                                                  | 8/5/1986         | Lee et al.                                  |       |                                      |                            |
|                                                                                                                                                                              | 48.       | 4,678,676                                                  | 7/7/1987         | Ishizuka et al.                             |       |                                      |                            |
|                                                                                                                                                                              | 49.       | 4,994,285                                                  | 2/19/1991        | Hisano et al.                               |       |                                      |                            |
|                                                                                                                                                                              | 50.       | 5,055,310                                                  | 10/18/1991       | Nonaka et al.                               |       |                                      |                            |
|                                                                                                                                                                              | 51.       | 5,264,239                                                  | 11/23/1993       | Cornet et al.                               |       |                                      |                            |
|                                                                                                                                                                              | 52.       | 5,443,852                                                  | 8/22/1995        | Shahidi et al.                              |       |                                      |                            |
|                                                                                                                                                                              | 53.       | 5,650,554                                                  | 7/22/1997        | Moloney et al.                              |       |                                      |                            |
|                                                                                                                                                                              | 54.       | 5,753,295                                                  | 5/19/1998        | Goldman                                     |       |                                      |                            |
|                                                                                                                                                                              | 55.       | 5,807,601                                                  | 9/15/1998        | Carpenter et al                             |       |                                      |                            |
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           |                                                            |                  | Date Considered<br><b>02/18/2016</b>        |       |                                      |                            |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |           |                                                            |                  |                                             |       |                                      |                            |

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Receipt date: 09/21/2015

Sheet 3 of 12

|                                                                                                                                                                                                                            |                                             |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|                                                                                                                                                                                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |

**U.S. Patent Documents**

| Examiner Initial | Desig. ID | Document Number | Publication Date | Patentee                | Class | Subclass | Filing Date If Appropriate |
|------------------|-----------|-----------------|------------------|-------------------------|-------|----------|----------------------------|
|                  | 56.       | 5,856,452       | 1/5/1999         | Moloney et al.          |       |          |                            |
|                  | 57.       | 5,922,392       | 7/13/1999        | Kelly et al.            |       |          |                            |
|                  | 58.       | 6,093,424       | 7/25/2000        | Han et al.              |       |          |                            |
|                  | 59.       | 6,146,645       | 11/14/2000       | Deckers et al.          |       |          |                            |
|                  | 60.       | 6,183,762       | 2/6/2001         | Deckers et al.          |       |          |                            |
|                  | 61.       | 6,210,742       | 4/3/2001         | Deckers et al.          |       |          |                            |
|                  | 62.       | 6,228,418       | 5/8/2001         | Gluck                   |       |          |                            |
|                  | 63.       | 6,242,036       | 6/5/2001         | Han et al.              |       |          |                            |
|                  | 64.       | 6,287,620       | 9/11/2001        | Van Den Ouweland et al. |       |          |                            |
|                  | 65.       | 6,372,234       | 4/16/2002        | Deckers et al.          |       |          |                            |
|                  | 66.       | 6,372,961       | 4/16/2002        | Tarczyński              |       |          |                            |
|                  | 67.       | 6,379,738       | 4/30/2002        | Dingman et al.          |       |          |                            |
|                  | 68.       | 6,383,531       | 5/7/2002         | Gottmoller              |       |          |                            |
|                  | 69.       | 6,399,135       | 6/4/2002         | Gottmoller              |       |          |                            |
|                  | 70.       | 6,413,569       | 7/2/2002         | Borders et al.          |       |          |                            |
|                  | 71.       | 6,416,797       | 7/9/2002         | Han et al.              |       |          |                            |
|                  | 72.       | 6,420,148       | 7/16/2002        | Yamaguchi               |       |          |                            |
|                  | 73.       | 6,495,184       | 12/17/2002       | Zheng et al.            |       |          |                            |
|                  | 74.       | 6,495,187       | 12/17/2002       | Borders et al.          |       |          |                            |
|                  | 75.       | 6,509,453       | 1/21/2003        | Moloney                 |       |          |                            |
|                  | 76.       | 6,582,710       | 6/24/2003        | Deckers et al.          |       |          |                            |
|                  | 77.       | 6,596,287       | 7/22/2003        | Deckers et al.          |       |          |                            |
|                  | 78.       | 6,599,513       | 7/29/2003        | Deckers et al.          |       |          |                            |
|                  | 79.       | 6,692,788       | 2/17/2004        | Mottram et al.          |       |          |                            |
|                  | 80.       | 6,761,914       | 7/13/2004        | Deckers et al.          |       |          |                            |
|                  | 81.       | 6,908,634       | 6/21/2005        | Hwang                   |       |          |                            |
|                  | 82.       | 6,936,749       | 8/30/2005        | Guy et al.              |       |          |                            |

|                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            | Date Considered<br><b>02/18/2016</b> |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                                      |

Substitute Disclosure Form

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.G./

Motif Exhibit 1148, Page 3284 of 3341

Receipt date: 09/21/2015

Sheet 4 of 12

|                                                                                                                                                                                                                        |                                             |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| Substitute Disclosure Form<br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|                                                                                                                                                                                                                        | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                                                                        | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |

**U.S. Patent Documents**

| Examiner Initial | Desig. ID | Document Number | Publication Date | Patentee            | Class | Subclass | Filing Date If Appropriate |
|------------------|-----------|-----------------|------------------|---------------------|-------|----------|----------------------------|
|                  | 83.       | 7,052,879       | 5/30/2006        | Shaw et al.         |       |          |                            |
|                  | 84.       | 7,332,587       | 2/19/2008        | Moloney             |       |          |                            |
|                  | 85.       | 7,407,786       | 8/5/2008         | Giver et al.        |       |          |                            |
|                  | 86.       | 7,479,472       | 1/20/2009        | Harbury et al.      |       |          |                            |
|                  | 87.       | 7,585,645       | 9/8/2009         | Deckers et al.      |       |          |                            |
|                  | 88.       | 7,622,290       | 11/24/2009       | Brunstedt et al.    |       |          |                            |
|                  | 89.       | 7,666,618       | 2/23/2010        | Miasnikov et al.    |       |          |                            |
|                  | 90.       | 7,666,628       | 2/23/2010        | Moloney             |       |          |                            |
|                  | 91.       | 7,674,953       | 3/9/2010         | Mulet Salort et al. |       |          |                            |
|                  | 92.       | 7,709,044       | 5/4/2010         | Ishimoto            |       |          |                            |
|                  | 93.       | 7,807,870       | 10/5/2010        | Geigenberger et al. |       |          |                            |
|                  | 94.       | 7,931,925       | 4/26/2011        | Nielsen             |       |          |                            |
|                  | 95.       | 8,012,732       | 9/6/2011         | Brunstedt et al.    |       |          |                            |
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| Examiner Initial | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation      |    |
|------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------|----|
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|                  | 100.      | CN 101541187A   | 9/23/2009        | CHINA                    |       |          | English Abstract |    |
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|                  | 105.      | CN 1407108A     | 4/2/2003         | CHINA                    |       |          | English Abstract |    |

Examiner Signature  
/ELIZABETH GWARTNEY/Date Considered  
02/18/2016

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| Substitute Disclosure Form<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b))                     |           | U.S. Department of Commerce<br>Patent and Trademark Office |                         | Attorney Docket No.<br><b>38767-0010001</b> |       | Application No.<br><b>14/796,970</b> |                  |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------|-------------------------|---------------------------------------------|-------|--------------------------------------|------------------|----|
|                                                                                                                                                                              |           |                                                            |                         | Applicant<br><b>Impossible Foods Inc.</b>   |       |                                      |                  |    |
|                                                                                                                                                                              |           |                                                            |                         | Filing Date<br><b>July 10, 2015</b>         |       | Group Art Unit                       |                  |    |
| <b>Foreign Patent Documents or Published Foreign Patent Applications</b>                                                                                                     |           |                                                            |                         |                                             |       |                                      |                  |    |
| Examiner Initial                                                                                                                                                             | Desig. ID | Document Number                                            | Publication Date        | Country or Patent Office                    | Class | Subclass                             | Translation      |    |
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| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           |                                                            |                         | Date Considered<br><b>02/18/2016</b>        |       |                                      |                  |    |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |           |                                                            |                         |                                             |       |                                      |                  |    |

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|                                                                                                                    |                                                            |                                             |                                      |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| Substitute Disclosure Form                                                                                         | U.S. Department of Commerce<br>Patent and Trademark Office | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b)) |                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                    |                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |

**Foreign Patent Documents or Published Foreign Patent Applications**

| Examiner Initial | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation      |    |
|------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------|----|
|                  |           |                 |                  |                          |       |          | Yes              | No |
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|                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            | Date Considered<br><b>02/18/2016</b> |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                                      |

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| Substitute Disclosure Form                                                                                                                                                   |           | U.S. Department of Commerce<br>Patent and Trademark Office                                                                                                                                                                                                                                                                                    | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b))                                                           |           |                                                                                                                                                                                                                                                                                                                                               | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                              |           |                                                                                                                                                                                                                                                                                                                                               | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |
| <b>Other Documents (include Author, Title, Date, and Place of Publication)</b>                                                                                               |           |                                                                                                                                                                                                                                                                                                                                               |                                             |                                      |
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| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           | Date Considered<br><b>02/18/2016</b>                                                                                                                                                                                                                                                                                                          |                                             |                                      |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |           |                                                                                                                                                                                                                                                                                                                                               |                                             |                                      |

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| Substitute Disclosure Form                                                                                                                                                   |           | U.S. Department of Commerce<br>Patent and Trademark Office                                                                                                                                                                                                                                              | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| <b>Information Disclosure Statement</b><br><b>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b))                                                     |           |                                                                                                                                                                                                                                                                                                         | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                                                                              |           |                                                                                                                                                                                                                                                                                                         | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |
| <b>Other Documents (include Author, Title, Date, and Place of Publication)</b>                                                                                               |           |                                                                                                                                                                                                                                                                                                         |                                             |                                      |
| Examiner Initial                                                                                                                                                             | Desig. ID | Document                                                                                                                                                                                                                                                                                                |                                             |                                      |
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| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           | Date Considered<br><b>02/18/2016</b>                                                                                                                                                                                                                                                                    |                                             |                                      |
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| Substitute Disclosure Form                                                                                                                                                   |           | U.S. Department of Commerce<br>Patent and Trademark Office                                                                                                                                                                                                                                                                                          | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
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|                                                                                                                                                                              |           |                                                                                                                                                                                                                                                                                                                                                     | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |
| <b>Other Documents (include Author, Title, Date, and Place of Publication)</b>                                                                                               |           |                                                                                                                                                                                                                                                                                                                                                     |                                             |                                      |
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| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           | Date Considered<br><b>02/18/2016</b>                                                                                                                                                                                                                                                                                                                |                                             |                                      |
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| Substitute Disclosure Form                                                                                                                                                   |           | U.S. Department of Commerce<br>Patent and Trademark Office                                                                                                                                                                                                                                                                                                                                                              | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
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| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            |           | Date Considered<br><b>02/18/2016</b>                                                                                                                                                                                                                                                                                                                                                         |                                             |                                      |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |           |                                                                                                                                                                                                                                                                                                                                                                                              |                                             |                                      |

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Receipt date: 09/21/2015

Sheet 12 of 12

| Substitute Disclosure Form                                                                                         |           | U.S. Department of Commerce<br>Patent and Trademark Office                                                                                                                                                                                                                                                                                                                                                                                 | Attorney Docket No.<br><b>38767-0010001</b> | Application No.<br><b>14/796,970</b> |
|--------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------|
| <b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br>(37 CFR §1.98(b)) |           |                                                                                                                                                                                                                                                                                                                                                                                                                                            | Applicant<br><b>Impossible Foods Inc.</b>   |                                      |
|                                                                                                                    |           |                                                                                                                                                                                                                                                                                                                                                                                                                                            | Filing Date<br><b>July 10, 2015</b>         | Group Art Unit                       |
| <b>Other Documents (include Author, Title, Date, and Place of Publication)</b>                                     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                             |                                      |
| Examiner Initial                                                                                                   | Desig. ID | Document                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                             |                                      |
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|                                                                                                                                                                              |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Examiner Signature<br><b>/ELIZABETH GWARTNEY/</b>                                                                                                                            | Date Considered<br><b>02/18/2016</b> |
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Attorney's Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                        |                                          |             |              |
|------------------------|------------------------------------------|-------------|--------------|
| First Named Inventor : | Marija Vrljic                            | Art Unit :  | 1791         |
| Serial No. :           | 14/796,970                               | Examiner :  | Elizabeth A. |
| Filed :                | July 10, 2015                            |             | Gwartney     |
|                        |                                          | Conf. No. : | 8501         |
| Title :                | METHODS AND COMPOSITIONS FOR CONSUMABLES |             |              |

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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DATED APRIL 10, 2018

Applicant, as a Large Entity, submits nine (9) sheets of Substitute Drawings in compliance with 37 CFR § 1.84.

Applicant understands that this perfects the application, and no additional papers or filing fees are required. If this is incorrect, please apply any charges, or credits, to Deposit Account No. 06-1050, referencing the above-indicated Attorney Docket Number.

Respectfully submitted,

Date: /April 25, 2018/

/M. Angela Parsons/  
M. Angela Parsons, Ph.D.  
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METHODS AND COMPOSITIONS FOR CONSUMABLES

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FIG. 1

SEQ ID NO:1 *Vigna radiata*  
MTTTLERGFTEEQEALVVKSWNVMMKKNSEGLGLKFFLKIFEIAPSAQKLFSFLRDSTVP  
LEQNPKLKPHAVSVFVMTCDASVQLRKAGKVTVRESNLKKLGATHFRTGVANEHFEVTK  
FALLETIKEAVPEMWSPAMKNAWGEAYDQLVDAIKYEMKPPSS

SEQ ID NO:2 *Methylophilum inferorum*  
MIDQKEKELIKESWKRIEPPNKNEIGLLFYANLFKEEPTVSVLFQNPISQSRKLMQVLG  
ILVQIGIDNLEGLIPTLQDLGRRHKQYGVVDSDHYPLVGDCLLKSIEYLGQGFTEEAKAA  
WTKVYGIAAQVMTAE

SEQ ID NO:3 *Aquifex aeolicus*  
MLSEETIRVIKSTVPLLKEHGTEITARMYELLSKYPKTKELFAGASEEQPKLANAI I  
AYATYIDRLEELDNAISTARSHVRRNVKPEHYPLVKECLLQAIEEVLNPGEEVLKAW  
EAYDFLAKTLITLLEKKLYSQP

SEQ ID NO:4 *Glycine max*  
MGAFTEKQEALVSSSFSAFKANIPQYSVVFYTSILEKAPAAKDLFSFLSNGVDPSNP  
KL TGHAEKLFGLVRDSAGQLKANGTVVADAALGSIHAQKAITDPQFVVVKEALLKTI  
KEAV GDKWSELSAWAVAYDELAAAIKKA

SEQ ID NO:5 *Hordeum vulgare*  
MSAAEGAVVFSEEKEALVLKSWAIMKKDSANLGLRFFLKIFEIAPSARQMFPFLRSDV  
PLETNPKLKTHAVSVFVMTCEAAAQLRKAGKITVRETTLRLLGGTHLKYGVADGHFEV  
T RFALLETIKEALPADMWGPENRANWGEAYDQLVAAIKQEMKPAE

SEQ ID NO:6 *Magnaporthe oryzae*  
1 mdgavrlwdt gldltgheih dgvpasrvq vmvsfplfkd qhiimsskes psrksstigg  
61 strngscqad tqkgqlppvg ekpkpvkenp mkkklkemsqr plptqhgdt yptekklgti  
121 gedlkhirgy dvktllamvk sklkgelkld dktmlmervm qlvarlptes kkraeltdsl  
181 inelwesldh pplnlylgep syrtpdgsyn hpfnpqlgaa gsryarsvip tvtpgpalpd  
241 pglifdsimg rtpnsyrkhp nnvssilwyw atiihdifw tdprdintnk sssyldlapl  
301 ygnsqemqds irtfkdgrrm pdcyadkrla gmpggsvll imfnrfrhnhv aenlalineg  
361 grfnkpsdll egeareaawk kyndndlfqva rlvtsglyin itlvdyvrni vnlrvdttw  
421 tldprqdaga hvgtadgaer gtgnavsae fncyrwhsci sekdskfvea qfqnifgkpa  
481 sevrpdemwk gfakmeqntp adpgqrftgg fkrpdpdkfd dddlvrcise avedvagafg  
541 arnvpqamkv vetmgiiqgr kwnvaglnef rkfhflkpys tfedinsdpv vaealrrlyd  
601 hpdnvelypg lvaeedkqpm vpgvgipty tivrsvlsda vclvrgdrfy ttdftprnlt

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FIG. 1 (CONT.)

661 nwgykevdyd lsvnhgcvfy klfirafpnh fkqnsvyahy pmvvpksenr ilealgradl  
721 fdfeapkyip prvnitsygg aeyiletqek ykvtwheglg flmgeggglkf mlsghddplha  
781 qqrkcmaaql ykdgwteavk afyagmmeel lvksyflgn nkhrhvdiir dvgnmvvhvf  
841 asqvfglplk taknptgvft eqemygilaa ifttiffdld psksfplrtk trevcqklak  
901 lveanvklin kipwsrgmfv gkpakdepls iygktmikgl kahglstdydi awshvvptsg  
961 amvnpqaqvf aqavdyylsp agmhyipeih mvalqpstpe tdalllgyam egirlagtfg  
1021 syreaavddv vkedngrqvp vkagdrfvsv fvdaardpkh fdpdevvnpr rpakkyihyg  
1081 vgphaclgrd asqiaitemf rclfrrrnvr rvpqpggelk kvprpggyfv ymredwgglf  
1141 pfpvtmrvmw dde

SEQ ID NO:7 *Fusarium oxysporum*

1 MKGSATLafa LVQfSAASQL VWPSKWDEVE DLLYMqGGFN KRGFADALRT CEFGSNVPGT  
61 QNTAEWLRTA FHDAITHDAK AGTGGLDASI YWESSRPENP GKAFNNTFGF FSGFHNPRAT  
121 ASDLTALGTV LAVGACNGPR IPFRAGRIDA YKAGPAGVPE PSTNLKDTFA AFTKAGFTKE  
181 EMTAMVACGH AIGGVHSDVF PEIVGIKADP NNDTNVPFQK DVSSFHNGIV TEYLAGTSKN  
241 PLVASKNATF HSDKRIFDND KATMKKLSTK AGFNSMCADI LTRMIDTVFK SVQLTPVLEA  
301 YDVRPYITEL SLNNKNKIHF TGSVRVRITN NIRDNNDLAI NLIYVGRDgK KVTVPtQQVT  
361 FQGGTSFGAG EVFANFEFDT TMDAKNGITK FFIQEVKpST KATVTHDNQK TGGYKVDDTV  
421 LYQLQQSCAV LEKLPNAPLV VTAMVRDARA KDALTlRVah KKPVKGSIVP RFQTaitNFK  
481 ATGKSSSGYT GFQAKTMFEE QSTYFDIVLG GSPASGVQFL TSQAMPsQCS

SEQ ID NO:8 *Fusarium graminearum*

1 masatrqfar aatratrngf aiaprqvirq qgrryyssep aqksssaWiW ltgaavagga  
61 gyyfygnsas satakvnps kedyqkyne iaarleekdd yddgsygpvl vrlawhasgt  
121 ydketgtggs ngatmrfape sdhganagla aardflqpvk ekfpwitysd lwilagvcai  
181 qemlgpaipy rpgsrdrdvs gctpdgrlpd askrqdhlg ifgrmgfndq eivalsgaha  
241 lgrchtdrsg ysgpwtfsp vltndyfrll veekwqwkW ngpaqyedks tkslmmLpsd  
301 ialiedkkfk pwvekyakdn daffkdfsNv vlrlfelgvp faqgtengrW tfkpthqe

SEQ ID NO: 9 *Chlamydomonas eugametos*

MSLFAKLGGREAVEAAVDKfYNKIVADPTVSTYfSNTDMKVQRsKQFAFLAYALGGASE  
WKGKDMRTAHKDLVPHLSDVHfQAVARHLSDTLTELGVPPEDITDAMAVVASTRTEVLN  
MPQQ

SEQ ID NO:10 *Tetrahymena pyriformis*

MNKPQTIYEKLGGENAMKAAVPLfYKKVLADERVKHFFKNTDMDHQTkQQTDfLTMLLG  
GPNHYKGKNMTEAHKGMNLQNLHfDAI IENLAATLkELGVTDaVINEAAKVIEHTRKDM  
LGK

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FIG. 1 (CONT.)

SEQ ID NO:11 *Paramecium caudatum*  
MSLFELQLGGQAAVQAVTAQFYANIQADATVATFFNGIDMPNQTNKTA AFLCAALGGPNA  
WTGRNLKEVHANMGVSNAQFTTVIGHLRSALTGAGVAAALVEQTVAVAETVRGDVVTV

SEQ ID NO:12 *Aspergillus niger*  
MPLTPEQIKI I KATVPVLQEYGTKITTA FYMMSTVHPELNAVFNTANQVKGHQARALA  
GALFAYASHIDDLGALGPAVELICNKHASLYIQADEYKIVGKYLLEAMKEVLGDACTDD  
ILDAWGAAYWALADIMINREAALYKQSQG

SEQ ID NO:13 *Zea mays*  
MALAEADDGAVVFGEEQEALVLKSWAVMKKDAANLGLRFFFLKVFEIAPSAEQMFSFLRD  
SDVPLEKNPKLKTHAMSVFVMTCEAAAQLRKAGKVTVRDTTLKRLGATHLRYGVADGHF  
EVTGFALLETIKEALPADMWSLEMKKAWAEAYSQLVAAIKREMKPDA

SEQ ID NO:14 *Oryza sativa* subsp. *japonica*  
MALVEGNNGVSGGAVSFSEEQEALVLKSWAIMKKDSANIGLRFFFLKIFEVAPSASQMFS  
FLRNSDVPLEKNPKLKTHAMSVFVMTCEAAAQLRKAGKVTVRDTTLKRLGATHFKYGVG  
DAHFEVTRFALLETIKEAVPDMWSPAMKSAWSEAYNQLVAAIKQEMKPAE

SEQ ID NO:15 *Arabidopsis thaliana*  
MESEGKIVFTEEQEALVVKSWVMKKNSAELGLKLFIKIFEIAPTTHKMFSFLRDSPIP  
AEQNPCLKPHAMSVFVMCCESAVQLRKTGKVTVRDTTLKRLGASHSKYGVVDEHFEVAK  
YALLETIKEAVPEMWSPMKVAVGQAYDHLVAAIKAEMNLSN

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FIG. 1 (CONT.)

SEQ ID NO:16 *Pisum sativum*  
MGFTDKQEALVNSSWESFKQNLSGNSILFYTTILEKAPAAKGLFSFLKDTAGVEDSPKL  
QAHAEQVFLVRDSAAQLRKTGEVVLGNATLGAIHVQRGVTDPHFVVVKEALLQTIKKA  
SGNNWSEELNTAWEVAYDGLATAIKKAMT

SEQ ID NO:17 *Vigna unguiculata*  
MVAFSDKQEALVNGAYEAFKANIPKYSVVFYTTILEKAPAAKNLFSFLANGVDATNPKL  
TGHAEKLFGLVRDSAAQLRASGGVVADAALGAVHSQKAVNDAQFVVVKEALVKTLEAV  
GDKWSDELGTAVELAYDELAIAIKKAY

SEQ ID NO:18 *Bos taurus*  
MGLSDGEWQLVLNVAWGKVEADVAGHGQEVLRIRLFTGHPETLEKFDKFKHLKTEAEMKAS  
EDLKKHGNTVLTLALGGILKKKGHHEAEVKHLAESHANKHKIPVKYLEFISDAIIHVLHA  
KHPSDFGADAQAAMSKALELFRNDMAAQYKVLGFHG

SEQ ID NO:19 *Sus scrofa*  
MGLSDGEWQLVLNVWGKVEADVAGHGQEVLRIRLFKGHPETLEKFDKFKHLKSEDEMKA  
EDLKKHGNTVLTLALGGILKKKGHHEAELTPLAQSHATKHKIPVKYLEFISEAIIQVLQS  
KH PGDFGADAQGAMSKALELFRNDMAAKYKELGFQG

SEQ ID NO: 20 *Equus caballus*  
MGLSDGEWQQVLNVWGKVEADIAGHGQEVLRIRLFTGHPETLEKFDKFKHLKTEAEMKAS  
EDLKKHGTVVLTALGGILKKKGHHEALKPLAQSHATKHKIPIKYLEFISDAIIHVLHS  
KH PGDFGADAQGAMTKALELFRNDIAAKYKELGFQG

SEQ ID NO: 21 *Nicotiana benthamiana*  
MSSFTEEQEALVVKSWDSMKKNAGEWGLKFLKI FEIAPSAAKLFSLKDSNVPLEQNA  
KLKPHSKSVFVMTCEAAVQLRKAGKVVRDSTLKKLGATHFKYGVADHFEVTKFALLE  
TIKEAVPEMWSVDMKNAWGEAFDQLVNAIKTEMK

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FIG. 1 (CONT.)

SEQ ID NO: 22 *Bacillus subtilis*  
MGQSFNAPYEAIGEELLSQLVDTFYERVASHPLLKPIFPSDLTETARKQKQFLTQYLG  
PPLYTEEHGHPMLRARHLPFPITNERADAWLSCMKDAMDHVGLEGEIREFLFGRLELTA  
RHMVNQTEAEDRSS

SEQ ID NO: 23 *Corynebacterium glutamicum*  
MTTSENFYDSVGGEETFSLIVHRFYEQVPNDLILGPMYPPDDFEGAEQRLKMFLSQYWG  
GPKDYQEQRGHPRLMRHVNYPIGVTAERWLQMSNALDGVDLTAEQREAIWEHNVRA  
ADMLINSNPDPHA

SEQ ID NO: 24 *Synechocystis* PCC6803  
MSTLYEKLGGTTAVDLAVDKFYERVLQDDRIKHFFADVDMAKQRAHQKAFLTYAFGGTD  
KYDGRYMREAHKELVENHGLNGEHFDVAEDLLATLKEMGVPEDLIAEVAAVAGAPAHK  
RDVLNQ

SEQ ID NO: 25 *Synechococcus* sp. PCC 7335  
MDVALLEKSFEQISPRAIEFSASFYQNLFHHPKPLFAETSQTIQEKKLIFSLAII  
ENLRNPDILQPALKSLGARHAEVGTIKSHYPLVGQALIENTFAEYLAADWTEQLATAWVE  
AYDVIASTMIEGADNPAAYLEPELTFYEWLDLYGEESPKVRNAIATLTHFHYGEDPQDV  
QRDSRG

SEQ ID NO: 26 *Nostoc commune*  
MSTLYDNIGGQPAIEQVDELHKRIATDSLLAPVFAGTDMVKQRNHLVAFLAQIFEGPK  
QYGGRPMDKTHAGLNLQQPHFDAIAKHLGERMAVRGVSAENTKAALDRVTNMKGAILNK

SEQ ID NO: 27 *Bacillus megaterium*  
MREKIHSPYELLGGEHTISKLVDAFYTRVGQHPHELAPIFPDNLTTETARKQKQFLTQYLG  
GPSLYTEEHGHPMLRARHLPFEITPSRAKAWLTCMHEAMDEINLEGPERDELYHRLILT  
AQHMINSPEQTDEKGFH

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FIG. 2A

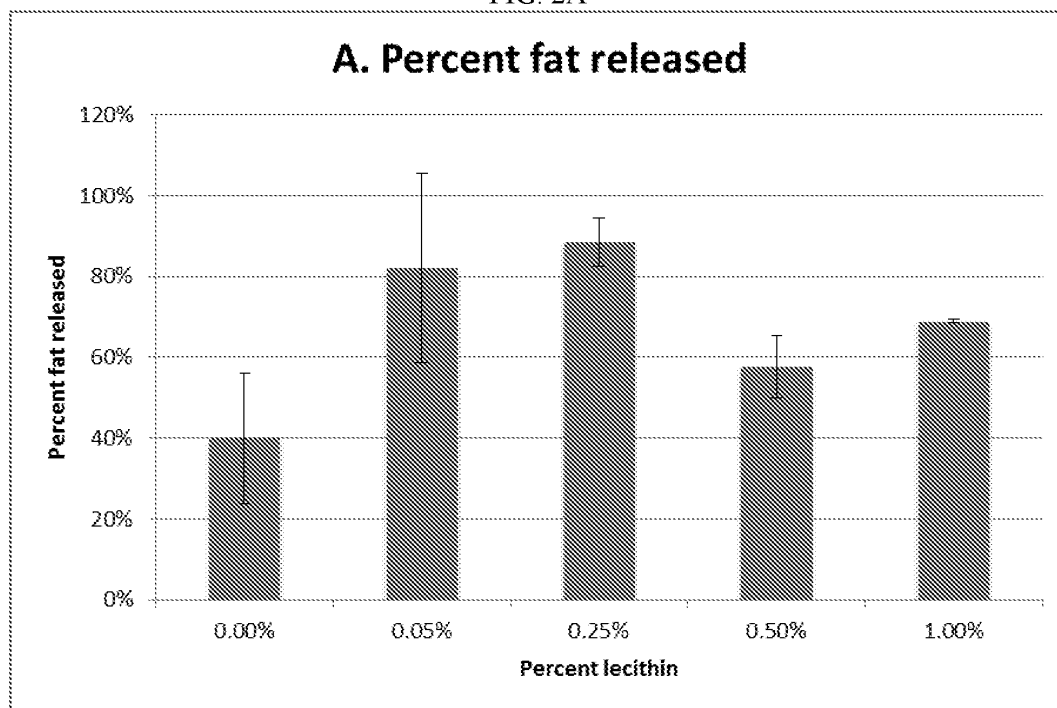
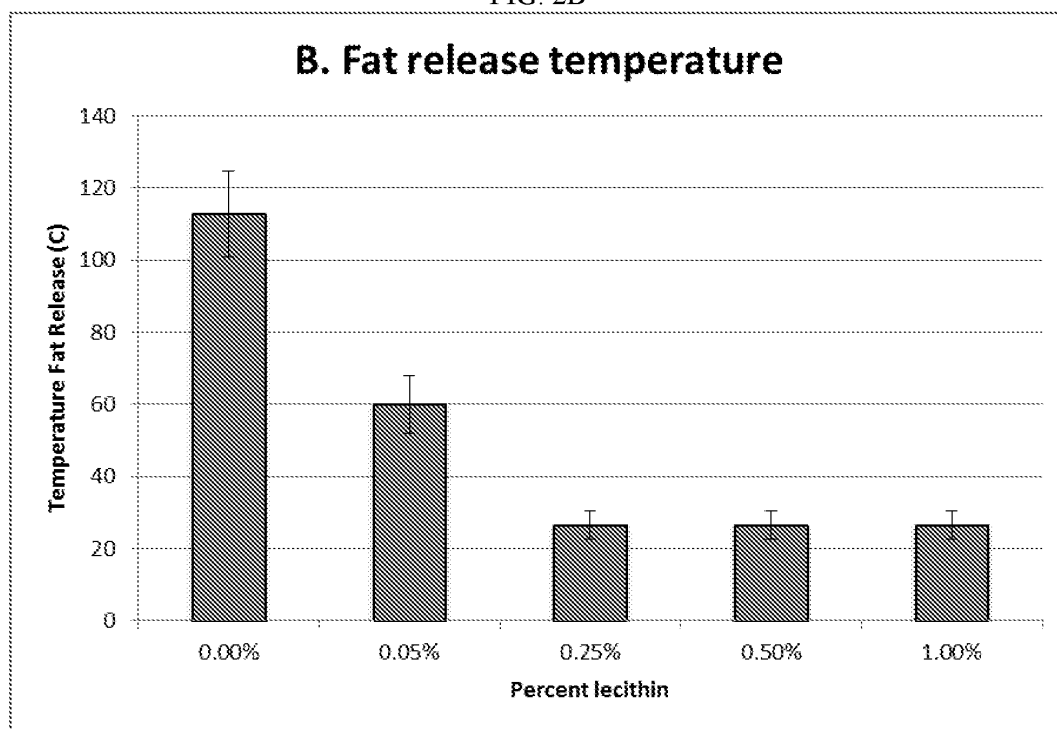


FIG. 2B



METHODS AND COMPOSITIONS FOR CONSUMABLES

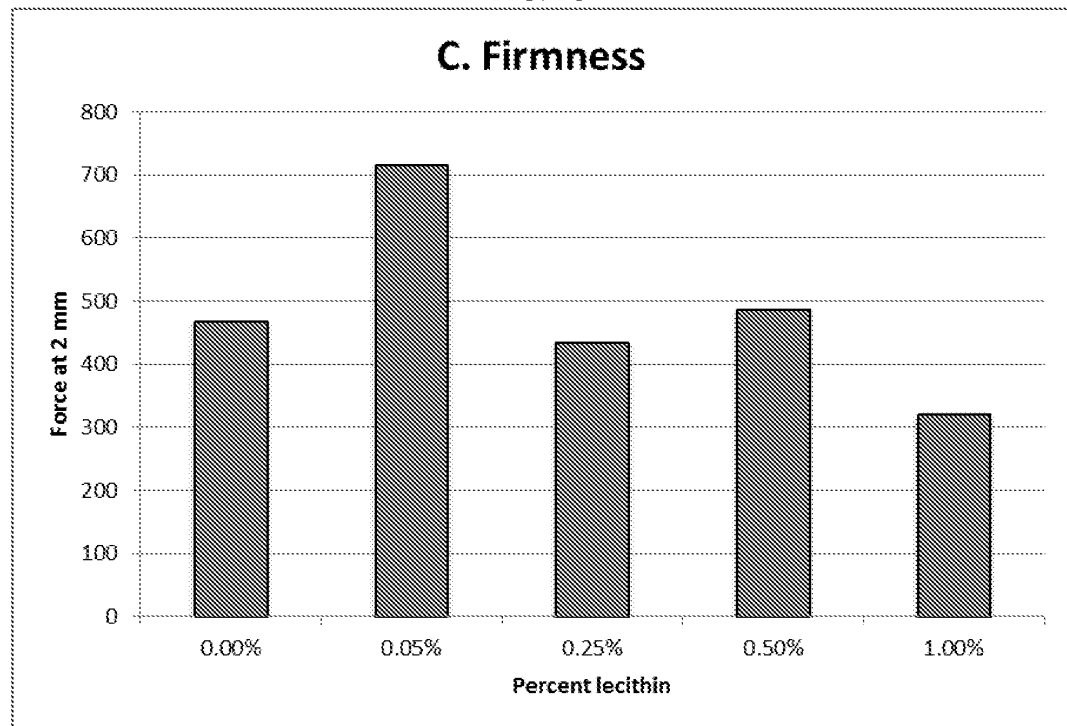
Marija Vrljic et al.

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REPLACEMENT DRAWINGS

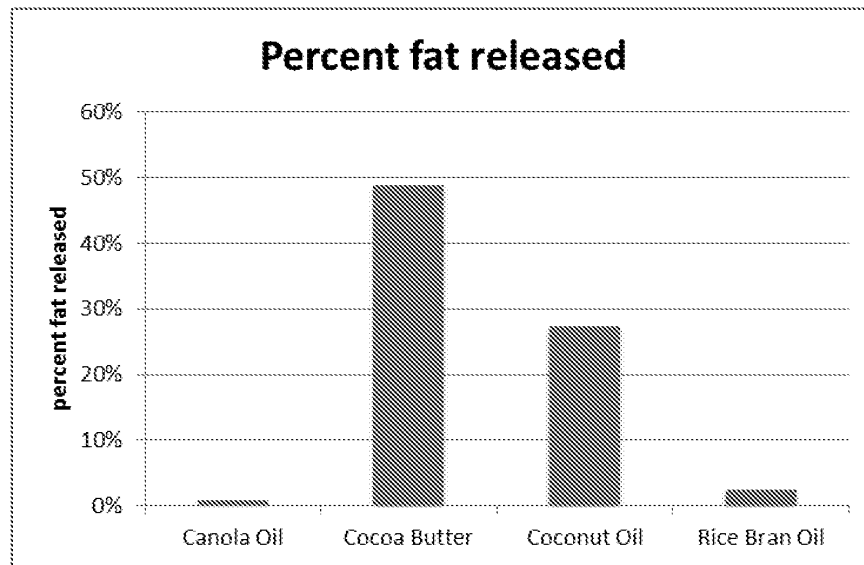
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FIG. 2C



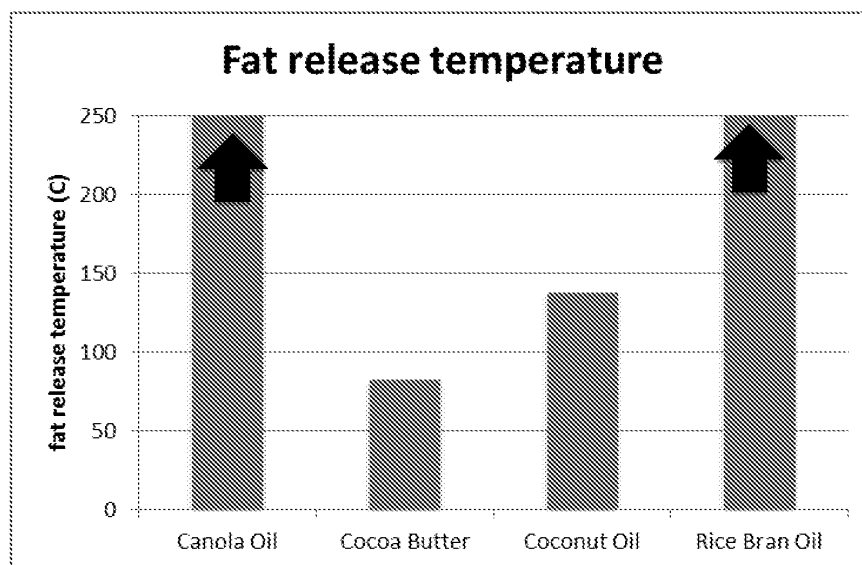
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FIG. 3



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FIG. 4



| Electronic Acknowledgement Receipt          |                                          |
|---------------------------------------------|------------------------------------------|
| <b>EFS ID:</b>                              | 32438760                                 |
| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Judith Witzel          |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
| <b>Receipt Date:</b>                        | 25-APR-2018                              |
| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 12:25:51                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

| Submitted with Payment | no                                      |                 |                                                   |                  |                  |
|------------------------|-----------------------------------------|-----------------|---------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                         |                 |                                                   |                  |                  |
| Document Number        | Document Description                    | File Name       | File Size(Bytes)/ Message Digest                  | Multi Part /.zip | Pages (if appl.) |
| 1                      | Post Allowance Communication - Incoming | RESPNTFCAPS.pdf | 52391<br>3bbd1a2af3d5381058166f4f9cc4a0db6f812a75 | no               | 1                |
| <b>Warnings:</b>       |                                         |                 |                                                   |                  |                  |

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| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                             |                         |                                          |    |   |
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| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                             |                         |                                          |    |   |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                             |                         |                                          |    |   |
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| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                                             |                         |                                          |    |   |

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Application Number: 14796970

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Attorney Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor : Marija Vrljic                      Art Unit : 1791  
Application No. : 14/796,970                      Examiner : Elizabeth A.  
Filed : July 10, 2015                      Gwartney  
Conf. No. : 8501  
Title : METHODS AND COMPOSITIONS FOR CONSUMABLES

**MAIL STOP ISSUE FEE**

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P.O. Box 1450  
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 Form. Foreign patent documents and non-patent literature are enclosed; cited U.S. patents will be provided on request.

This statement is being filed after a final action or a notice of allowance, but before payment of the issue fee. A late submission fee in the amount of \$240, specified by 37 CFR §1.17(p) is being paid with this statement.

Certification under 37 CFR § 1.97(e)(1)

Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement.

Apply any necessary charges or credits to deposit account 06-1050, referencing the above attorney docket number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: \_\_\_\_\_

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Sheet 1 of 1

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                                                                                            | Applicant<br>Impossible Foods Inc.   |                               |
|                                                                                                                                                                                                                            | Filing Date<br>July 10, 2015         | Group Art Unit<br>1791        |

| U.S. Patent Documents |           |                 |                  |           |       |          |                            |
|-----------------------|-----------|-----------------|------------------|-----------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee  | Class | Subclass | Filing Date If Appropriate |
|                       | 1.        | 4,132,809       | 01/02/1979       | Desrosier |       |          |                            |
|                       | 2.        | 4,411,915       | 10/25/1983       | Eriksson  |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |                  |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation      |    |
|                                                                   |           |                 |                  |                          |       |          | Yes              | No |
|                                                                   | 3.        | RU 2144293      | 01/20/2000       | RU                       |       |          | English Abstract |    |
|                                                                   | 4.        | SU 301014       | 01/15/1974       | USSR                     |       |          | English Abstract |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |          |
|-------------------------------------------------------------------------|-----------|----------|
| Examiner Initial                                                        | Desig. ID | Document |
|                                                                         | --        | --       |

|                                                                                                                                                                              |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Examiner Signature                                                                                                                                                           | Date Considered |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                 |

Substitute Disclosure Form



Espacenet

**Bibliographic data: RU2144293 (C1) — 2000-01-20**

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**METHOD OF PRODUCING ALBUMEN MASS "KLANVI"****Inventor(s):** KLASSEN N V; OLEJNIK V V  $\pm$  (KLASSEN N.V.; OLEJNIK V.V.)**Applicant(s):** OKHOZJAJSTVENNYJ UNI; DAL NEVOSTOCHNYJ G TEKHN RYB  $\pm$  (OKHOZJAJSTVENNYJ UNIVERSITET)**Classification:** - international: A23C19/02; A23C23/00; A23L17/00;  
(IPC1-7): A23C19/02; A23C23/00; A23L1/325  
- cooperative:**Application number:** RU19990106553 19990405**Priority number (s):** RU19990106553 19990405**Abstract of RU2144293 (C1)**

FIELD: food industry, particularly, preparation of dairy, meat and fish products.  
SUBSTANCE: method involves mixing of liquid component, minced fish, fat component and common salt, emulsifying and structuring of the mass. Before emulsifying filler is additionally introduced in the mixture and the latter is formed. Structure formation is carried out by freezing the mixture. All components are used in the following ratio; mas. %: liquid component, 8.5-89.0; minced fish, 10.0-55.0; fat component, 0.5-35.0; common salt, 0.5-1.5; filler, 0-35.0. EFFECT: higher organoleptical properties. 7 cl, 19 ex



(19) **RU** <sup>(11)</sup> **2 144 293** <sup>(13)</sup> **C1**  
(51) МПК<sup>7</sup> **A 23 C 23/00, 19/02, A 23 L**  
**1/325**

РОССИЙСКОЕ АГЕНТСТВО  
ПО ПАТЕНТАМ И ТОВАРНЫМ ЗНАКАМ

(12) ОПИСАНИЕ ИЗОБРЕТЕНИЯ К ПАТЕНТУ РОССИЙСКОЙ ФЕДЕРАЦИИ

(21), (22) Заявка: 99106553/13, 05.04.1999

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(46) Дата публикации: 20.01.2000

(56) Ссылки: RU 2113138 C1, 20.06.98. SU 1604318  
A1, 07.11.90. FR 2023743 A, 21.08.70.

(98) Адрес для переписки:  
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Дальрыбвтуз, Центр по охране прав  
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(54) СПОСОБ ПОЛУЧЕНИЯ БЕЛКОВОЙ МАССЫ "КЛАНВИ"

(57) Реферат:

Изобретение может быть использовано в пищевой промышленности, в частности при производстве молочных, мясных и рыбных изделий. Способ включает смешение жидкого компонента, рыбного фарша, жирового компонента и поваренной соли, эмульгирование и структурообразование смеси. Перед эмульгированием в смесь дополнительно вносят наполнитель. После эмульгирования смесь формуют, процесс структурообразования осуществляют замораживанием смеси, при этом

ингредиенты берут в следующих соотношениях, мас. %: жидкий компонент-8,5-89,0; рыбный фарш-10,0-55,0; жировой компонент- 0,5-35,0; поваренная соль-0,5-1,5, наполнитель- 0-35,0. Варьирование соотношениями исходных ингредиентов в заявленных интервалах, выбор соответствующих жидкого компонента, жирового компонента и наполнителя позволяют получить белковую массу с широким спектром органолептических свойств, присущих различным натуральным продуктам. 6 з.п. ф-лы.

RU 2 144 293 C1

RU 2 144 293 C1



RUSSIAN AGENCY  
FOR PATENTS AND TRADEMARKS

(19) **RU** <sup>(11)</sup> **2 144 293** <sup>(13)</sup> **C1**  
(51) Int. Cl.<sup>7</sup> **A 23 C 23/00, 19/02, A 23 L**  
**1/325**

(12) **ABSTRACT OF INVENTION**

(21), (22) Application: 99106553/13, 05.04.1999  
(24) Effective date for property rights: 05.04.1999  
(46) Date of publication: 20.01.2000  
(98) Mail address:  
690600, Vladivostok, GSP, ul.Lugovaja 52-B,  
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(54) **METHOD OF PRODUCING ALBUMEN MASS "KLANVI"**

(57) Abstract:  
FIELD: food industry, particularly,  
preparation of dairy, meat and fish  
products. SUBSTANCE: method involves mixing  
of liquid component, minced fish, fat  
component and common salt, emulsifying and  
structuring of the mass. Before emulsifying  
filler is additionally introduced in the

mixture and the latter is formed. Structure  
formation is carried out by freezing the  
mixture. All components are used in the  
following ratio, mas. %: liquid component,  
8.5-89.0; minced fish, 10.0-55.0; fat  
component, 0.5-35.0; common salt, 0.5-1.5;  
filler, 0-35.0. EFFECT: higher  
organoleptical properties. 7 cl, 19 ex

RU 2 144 293 C1

RU 2 144 293 C1

Изобретение относится к пищевой промышленности и может быть использовано при производстве молочных, мясных и рыбных изделий.

Известен способ получения белковой массы с волокнистой структурой и нейтральным вкусом и запахом, осуществляемый следующим образом: в пастеризованное и охлажденное до температуры 34°C обезжиренное молоко вносят 20-30 г (из расчета на 100 кг молока) хлористого кальция, 2-5% закваски из термофильного стрептококка неслизистой расы, выдерживают 30 мин при перемешивании и добавляют 2 г молокосвертывающего фермента. Через 30-35 мин полученный сгусток режут на кубики 2-6 см с одновременным подогревом до 36-42 °С, сыровотку удаляют, сгусток солят, чеддерируют при нагрузке 1,0-1,5 кг на 1 кг массы при 36-42°C. Через 30-40 мин пласт дробят, нагревают до 65-72 °С при перемешивании до получения тестообразной массы, которую формуют в блоки и охлаждают (Авторское свидетельство СССР, N 1604318, кл. А 23 С 19/06, 1990).

Недостатками данного способа являются трудоемкость процесса, высокая стоимость продукта из-за использования молочного сырья, бактериальной закваски и молокосвертывающего фермента.

Наиболее близким к заявляемому техническому решению по совокупности общих существенных признаков является способ получения рыбного продукта типа творог, включающий смешение рыбного фарша, растительного масла (жировой компонент), поваренной соли и воды (жидкий компонент), эмульгирование и структурообразование исходных компонентов, взятых в соотношениях, мас. %: рыбный фарш- 15-25, растительное масло- 10-25, поваренная соль- 1,0-1,5, вода - остальное. Процесс структурообразования осуществляют нагреванием смеси при постоянном перемешивании до образования агрегатов творога. Полученный продукт имеет органолептические свойства, аналогичные натуральному творогу (Патент РФ, N 2113138, кл. А 23 L 1/325, 1998).

Недостатком данного способа является невозможность получения продукта с широким спектром органолептических свойств.

Задачей настоящего изобретения является получение белковой массы с широким спектром органолептических свойств.

Поставленная задача решается тем, что в известном способе, включающем смешение жидкого компонента, рыбного фарша, жирового компонента и поваренной соли, эмульгирование и структурообразование смеси, перед эмульгированием в смесь дополнительно вносят наполнитель, после эмульгирования смесь формуют, процесс структурообразования осуществляют замораживанием смеси, при этом ингредиенты берут в следующих соотношениях, мас. %:

Жидкий компонент - 8,5-89,0  
Рыбный фарш - 10,0-55,0  
Жировой компонент - 0,5-35,0  
Поваренная соль - 0,5-1,5  
Наполнитель - 0-35,0

Варьирование соотношениями исходных ингредиентов в заявленных интервалах позволяет получить белковую массу с широким спектром органолептических свойств, присущих натуральным продуктам, например сыру, или мясу теплокровных животных, или мясу птицы, или мясу рыбы, или мясу беспозвоночных, или грибам. Для усиления вкуса и запаха вносят соответствующий жидкий компонент, жировой компонент и наполнитель.

Для получения продукта, имитирующего сыр, в качестве жидкого компонента используют молочное сырье (нормализованное, обезжиренное или восстановленное молоко или молочную сыворотку).

Для получения продукта с нейтральным вкусом и запахом и слоисто-волокнистой структурой в качестве жидкого компонента используют воду или соевую дисперсию (0,1-8,0%-ную дисперсию соевого изолята в воде или соевое молоко, полученное из соевых бобов).

Для получения продукта, имитирующего мясо теплокровных животных (говядины, баранины, свинины и др.), или мясо птицы (курицы, индейки и др.), или мясо рыбы (лососевых, осетровых и др.), или мясо беспозвоночных (крабов, креветок, омара, лангуста, гребешка, устрицы, кальмара и др.), в качестве жидкого компонента используют бульон после термической обработки (варки, бланширования и др.) мяса или пищевых отходов (костей, голов, кожи и др.) теплокровных животных, или птицы, или рыбы, или беспозвоночных; для получения продукта, имитирующего грибы, в качестве жидкого компонента используют бульон после термической обработки (варки, бланширования и др.) грибов.

Для получения продукта, имитирующего сыр, или мясо теплокровных животных, или мясо птицы, или мясо рыбы, или мясо беспозвоночных, в качестве наполнителя используют соответственно сыр (мягкий, твердый и др.), или мясо теплокровных животных, или мясо птицы, или мясо рыбы, или мясо беспозвоночных; для получения продукта, имитирующего грибы, в качестве наполнителя используют грибы.

Для получения продукта, имитирующего сыр, или мясо теплокровных животных, или мясо птицы, или мясо рыбы, или мясо беспозвоночных, или грибы, в качестве наполнителя используют соответствующие вкусоароматические добавки (например, сырную, или говяжью, или куриную, или лососевую, или крабовую, или грибную и т.д.).

Для получения продукта, имитирующего по внешнему виду сыр, или мясо теплокровных животных, или мясо птицы, или мясо рыбы, или мясо беспозвоночных, или грибы, после замораживания на поверхность продукта наносят пищевой краситель соответствующего цвета.

В качестве жирового компонента используют соевое, подсолнечное, кукурузное или оливковое или другое растительное масло или животные жиры.

Заявляемые количественные интервалы исходных ингредиентов являются существенными признаками и отклонение от них не позволяет решить поставленную перед изобретением задачи.

Так, снижение содержания жидкого компонента ниже 8,5 мас.% не позволяет сформировать требуемую структуру белковой массы, а повышение его содержания выше 89,0 мас.% не позволяет получить продукт предложенным способом.

Уменьшение содержания рыбного фарша и жирового компонента ниже 10,0 мас. % и 0,5 мас.% соответственно не позволяет получить белковую массу предложенным способом, а увеличение содержания ингредиентов более 55,0 мас.% и 35,0 мас.% соответственно не позволяет придать ей требуемую структуру.

Поваренная соль вносится в количестве от 0,5 до 1,5 мас.%, достаточном для формирования структуры и вкуса продукта.

Увеличение содержания наполнителя выше 35,0 мас.% не позволяет сформировать нужную структуру продукта.

Способ осуществляют следующим образом.

Пример 1. В смеситель с мешалкой вносят 34,0 кг нормализованного молока (34,0 мас.%), 40,0 кг рыбного фарша сурими (40,0 мас.%), 25,0 кг соевого масла (25,0 мас.%) и 1,0 кг поваренной соли (1,0 мас.%). Смесь гомогенизируют при скорости вращения мешалки 1500 об/мин в течение 6 мин. После окончания эмульгирования смесь формируют в виде брикетов и замораживают до температуры минус 18°C. Полученный продукт имеет выраженный молочный вкус и запах, пористую структуру, характерную для сыра, белый цвет.

Пример 2. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют молочную сыворотку, в качестве рыбного фарша - фарш из минтая, в качестве жирового компонента - кукурузное масло, а ингредиенты берут в следующем соотношении: молочная сыворотка - 8,5 мас.%, рыбный фарш - 55,0 мас.%, кукурузное масло - 35,0 мас.%, поваренная соль - 1,5 мас.%. Полученный продукт имеет кисломолочный вкус и запах, пористую структуру, характерную для сыра, белый цвет.

Пример 3. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют воду, замораживание ведут до температуры минус 8°C, а ингредиенты берут в следующем соотношении: вода - 54,5 мас.%, рыбный фарш - 20,0 мас.%, соевое масло - 25,0 мас.%, поваренная соль - 0,5 мас.%. Полученный продукт имеет нейтральный вкус и запах, слоисто-волокнистую структуру, белый цвет.

Пример 4. Осуществляют аналогично примеру 3, при этом в качестве жидкого компонента используют соевое молоко, полученное из соевых бобов. Полученный продукт имеет нейтральный вкус и запах, слоисто-волокнистую структуру, светло-кремовый цвет.

Пример 5. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после варки мяса говядины, в качестве жирового компонента используют животный жир, замораживание ведут до температуры минус 12°C, а ингредиенты берут в следующем соотношении: бульон - 49,3 мас.%, рыбный фарш - 35,0 мас.%, животный жир - 15,0 мас.%, поваренная соль - 0,7 мас.%. Полученный продукт имеет вкус и запах

говядины, характерную для мяса говядины структуру и цвет.

Пример 6. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после варки курицы, в качестве жирового компонента используют подсолнечное масло, а ингредиенты берут в следующем соотношении: бульон - 59,2 мас.%, рыбный фарш - 20,0 мас.%, подсолнечное масло - 20,0 мас.%, поваренная соль - 0,8 мас.%. Полученный продукт имеет вкус и запах курицы, характерную для мяса курицы структуру, белый цвет.

Пример 7. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после бланширования горбуши, в качестве жирового компонента используют оливковое масло, а ингредиенты берут в следующем соотношении: бульон - 64,5 мас.%, рыбный фарш - 25,0 мас.%, оливковое масло - 10,0 мас.%, поваренная соль - 0,5 мас.%. Полученный продукт имеет характерный для лососевых вкус, запах и консистенцию, розоватый цвет.

Пример 8. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после варки гребешка, в качестве жирового компонента используют кукурузное масло, смесь формируют в виде мускула гребешка, а ингредиенты берут в следующем соотношении: бульон - 54,4 мас.%, рыбный фарш - 30,0 мас.%, кукурузное масло - 15,0 мас.%, поваренная соль - 0,6 мас.%. Полученный продукт имеет вкус и запах гребешка, характерную для мускула гребешка структуру, белый цвет.

Пример 9. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после бланширования краба, в качестве жирового компонента используют оливковое масло, смесь формируют в виде ножек краба, а ингредиенты берут в следующем соотношении: бульон - 54,0 мас.%, рыбный фарш - 25,0 мас.%, оливковое масло - 20,3 мас.%, поваренная соль - 0,7 мас.%. Полученный продукт имеет вкус и запах краба, характерную для мяса краба структуру, белый с розоватым оттенком цвет.

Пример 10. Осуществляют аналогично примеру 1, при этом в качестве жидкого компонента используют бульон после бланширования устриц, смесь формируют в виде устриц, а ингредиенты берут в следующем соотношении: бульон - 89,0 мас.%, рыбный фарш - 10,0 мас.%, соевое масло - 0,5 мас.%, поваренная соль - 0,5 мас.%. Полученный продукт имеет характерные для мяса устрицы вкус, запах, консистенцию и цвет.

Пример 11. Осуществляют аналогично примеру 5, при этом в качестве жидкого компонента используют бульон после варки костей говядины. Полученный продукт имеет вкус и запах говядины, характерные для мяса говядины структуру и цвет.

Пример 12. Осуществляют аналогично примеру 11, но перед эмульгированием вносят наполнитель, в качестве которого используют мясо говядины, а ингредиенты берут в следующем соотношении: бульон - 54,3 мас.%, рыбный фарш - 25,0 мас.%, животный жир - 15,0 мас.%, поваренная соль -

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0,7 мас.%, мясо говядины - 5,0 мас.%. Полученный продукт имеет вкус и запах говядины, характерные для мяса говядины структуру и цвет.

Пример 13. Осуществляют аналогично примеру 3, но перед эмульгированием вносят наполнитель, в качестве которого используют мясо баранины, а ингредиенты берут в следующем соотношении: вода - 49,0 мас.%, рыбный фарш - 30,0 мас.%, соевое масло - 10,0 мас.%, поваренная соль - 0,9 мас.%, мясо баранины - 10,1 мас.%. Полученный продукт имеет вкус и запах баранины, характерные для мяса баранины структуру и цвет.

Пример 14. Осуществляют аналогично примеру 13, при этом в качестве наполнителя используют сыр "Российский", смесь формуют в виде невысоких цилиндров, а ингредиенты берут в следующем соотношении: вода - 26,5 мас.%, рыбный фарш - 35,0 мас.%, соевое масло - 30,0 мас.%, поваренная соль - 1,0 мас.%, сыр - 7,5 мас.%. Полученный продукт имеет вкус, запах и пористую структуру, характерную для сыра, желтоватый цвет.

Пример 15. Осуществляют аналогично примеру 13, при этом в качестве наполнителя используют мясо креветки, смесь формуют в виде шейки креветки, а ингредиенты берут в следующем соотношении: вода - 45,0 мас.%, рыбный фарш - 14,5 мас.%, соевое масло - 25,0 мас.%, поваренная соль - 0,5 мас.%, мясо креветки - 15,0 мас.%. Полученный продукт имеет вкус и запах креветки, характерную для мяса креветки консистенцию, белый с розоватым оттенком цвет.

Пример 16. Осуществляют аналогично примеру 13, при этом в качестве наполнителя используют грибы, смесь формуют в виде грибов, а ингредиенты берут в следующем соотношении: вода - 47,0 мас.%, рыбный фарш - 12,4 мас.%, соевое масло - 5,0 мас.%, поваренная соль - 0,6 мас.%, грибы - 35,0 мас.%. Полученный продукт имеет вкус и запах грибов, характерную для грибов консистенцию, светло-коричневый цвет.

Пример 17. Осуществляют аналогично примеру 13, при этом в качестве наполнителя используют сырную вкусоароматическую добавку, а ингредиенты берут в следующем соотношении: вода - 16,5 мас.%, рыбный фарш - 50,0 мас.%, соевое масло - 30,0 мас.%, поваренная соль - 1,0 мас.%, сырная вкусоароматическая добавка - 2,5 мас.%. Полученный продукт имеет вкус, запах и пористую структуру, характерную для сыра, желтоватый цвет.

Пример 18. Осуществляют аналогично примеру 13, при этом в качестве наполнителя используют куриную вкусоароматическую добавку, а ингредиенты берут в следующем соотношении: вода - 54,8 мас.%, рыбный фарш - 20,0 мас.%, соевое масло - 20,0 мас.%, поваренная соль - 0,8 мас.%, куриная вкусоароматическая добавка - 4,4 мас.%. Полученный продукт имеет вкус и запах курицы, характерную для мяса курицы консистенцию, белый цвет.

Пример 19. Осуществляют аналогично примеру 9, при этом смесь формуют в виде палочек, после замораживания на поверхность продукта наносят пищевой краситель красного цвета. Полученный продукт имеет внешний вид, вкус, запах и

консистенцию, характерные для краба.

Таким образом, оптимальные дозировки внесения компонентов составляют, мас. %: жидкий компонент - 8,5-89,0, рыбный фарш - 10,0-55,0, жировой компонент - 0,5-35,0, поваренная соль - 0,5-1,5, наполнитель - 0-35,0.

Приведенные примеры (1-19) подтверждают, что применение предложенного способа позволяет получить белковую массу с широким спектром органолептических свойств.

Различные виды белковой массы, полученные по предложенной технологии, могут быть реализованы как самостоятельные изделия в качестве аналогов натуральных продуктов, например аналогов сыра, мяса говядины, курицы, креветки, грибов и т.д. Кроме того, белковую массу можно использовать при производстве молочных, мясных и рыбных изделий в качестве наполнителя.

Предложенная технология не предполагает использования химических реагентов (например, хлористого кальция). Кроме того, применение рыбного фарша при производстве белковой массы способствует повышению ее биологической и пищевой ценности, а использование растительных масел улучшает вкусовые качества, повышает усвояемость, способствует обогащению полиненасыщенными жирными кислотами. Поэтому полученная белковая масса может быть рекомендована для детского, диетического и лечебно-профилактического питания.

Предложенный способ позволяет получать продукцию на основе широкого спектра молочного, мясного и рыбного сырья, а также пищевых отходов (например, костей, голов, кожи и др.).

Предложенный способ прост, универсален, не требует сложного оборудования, обеспечивает непрерывность производства, при этом возможна полная механизация процесса.

Предложенная технология позволяет расширить ассортимент молочных, мясных и рыбных продуктов.

### Формула изобретения:

1. Способ получения белковой массы, включающий смешение жидкого компонента, рыбного фарша, жирового компонента и поваренной соли, эмульгирование и структурообразование смеси, отличающийся тем, что перед эмульгированием в смесь дополнительно вносят наполнитель, после эмульгирования смесь формуют, процесс структурообразования осуществляют замораживанием смеси, при этом ингредиенты берут в следующих соотношениях, мас. %:

Жидкий компонент - 8,5 - 89,0  
Рыбный фарш - 10,0 - 55,0  
Жировой компонент - 0,5 - 35,0  
Поваренная соль - 0,5 - 1,5  
Наполнитель - 0 - 35,0

2. Способ по п.1, отличающийся тем, что в качестве жидкого компонента используют молочное сырье.

3. Способ по п.1, отличающийся тем, что в качестве жидкого компонента используют воду или соевую дисперсию.

4. Способ по п.1, отличающийся тем, что в качестве жидкого компонента используют

бульон после термической обработки теплокровных животных, или птицы, или рыбы, или беспозвоночных, или грибов.

5. Способ по любому из пп.1 - 4, отличающийся тем, что в качестве наполнителя используют сыр, или мясо теплокровных животных, или мясо птицы, или мясо рыбы, или мясо беспозвоночных, или грибы.

6. Способ по любому из пп.1 - 5, отличающийся тем, что в качестве наполнителя используют вкусоароматические добавки.

5 7. Способ по любому из пп.1 - 6, отличающийся тем, что после замораживания на поверхность продукта наносят пищевой краситель.

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# О П И С А Н И Е ИЗОБРЕТЕНИЯ К АВТОРСКОМУ СВИДЕТЕЛЬСТВУ

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## СПОСОБ ПРИГОТОВЛЕНИЯ ПРОДУКТОВ, ИМИТИРУЮЩИХ МЯСОПРОДУКТЫ

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Изобретение относится к производству искусственных пищевых продуктов, в частности к производству мяса и мясопродуктов.

Известен способ приготовления продуктов, имитирующих мясопродукты, имеющие волокнистую структуру, путем приготовления раствора студнеобразующих веществ, например альгината натрия в водном растворе казеина, обработки в солевом растворе для коагуляции, например, в подкисленном растворе солей кальция, отделения коагулята, промывки слабым раствором кислоты, введения ароматизирующих и вкусовых веществ, например липидов, аминокислот, гидролизаторов, глютамината натрия, нуклеотидов, гомогенизации смеси при нагревании, формования в виде отдельных волокон, обработки связующим веществом, содержащим белки в смеси с различными добавками и термической обработки.

Однако этот способ включает образование каждого волокна в отдельности через фильтр и последующей обработки и склеивания их связующим при повышенной температуре, что значительно усложняет процесс и делает его дорогостоящим.

Предлагаемый способ исключает образование каждого волокна в отдельности через платиновые фильтры и последующую обработку их связующим и позволяет получить волокни-

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стую массу сразу в большом объеме. Это достигается тем, что формование массы осуществляют в подогретом состоянии путем ее растяжения, а после формования продукт охлаждают. Формуемую массу рекомендуется подогреть до 60—80°C, растяженные массы вести с градиентом сдвига в пределах 0,2—2 кг/см<sup>2</sup>, а охлаждение осуществлять до температуры в пределах 0—20°C.

5 Способ состоит в следующем.

10 Приготавливается коагулят пищевых белков или их смесей с заряженными полисахаридами, например, их совместным осаждением из водных растворов при действии кислот или солей. Полученный коагулят, отделяется, например, декантацией, центрифугированием или  
15 фильтрованием, промывается слабым раствором кислоты, добавляются ароматизирующие, вкусовые и пищевые вещества и красители.  
20 Смесь гомогенизируют при нагреве, после чего полученную пластичную массу подвергают растяжению при градиенте сдвига в пределах 0,2—2 кг/см<sup>2</sup> при 60—80°C. В результате получается волокнистая масса, которая может  
25 быть использована как определенные готовые мясопродукты, имеющие волокнистую структуру, например отварное мясо, заливное, а также подвергаться дальнейшей обработке, например, растворами солей кальция или алюминия, пропитке расплавленными животными  
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жирами, кукурузным или хлопковым маслом. Искусственные продукты питания волокнистой структуры, имитирующие различные мясопродукты, полученные по предлагаемому способу, могут быть подвергнуты копчению обычным способом — дымом и при помощи копильных препаратов высушиваться и продолжительно храниться в высушенном и замороженном состоянии.

Производство продуктов питания, имитирующих мясо и мясопродукты, позволяет рационально использовать различные белки, а также отходы мясной и других отраслей пищевой промышленности, например, измельченные малоценные сорта мяса, рыбы, мясную и рыбную муку, для приготовления диетических и лечебных продуктов питания со строго определенным содержанием пищевых компонентов, регулируемые органолептическими и технологическими характеристиками и низкой себестоимостью.

Способ поясняется примерами его осуществления.

Пример 1. 10 г альгината Na, 100 г казеина, 25 г NaCl и 10 г пищевого альбумина растворяют при 40—60°C при перемешивании в течение 30 мин в 720 г 0,05 раствора NaOH. Полученный раствор (рН—7,6) подают при 20°C тонкой струей в перемешиваемую коагуляционную ванну, содержащую 10%-ный раствор  $\text{Ca}(\text{CH}_3\text{COO})_2$  при рН коагуляционной ванны—6,0. Полученный коагулят отделяют фильтрацией через тканевый фильтр и промывают подсолненной водой до раствора коагуляционной ванны. После этого его подвергают экструзии при 50—60°C через экструзионную щелевую головку (длина 40 мм, ширина 15 мм). Экструзия сопровождается синергизмом.

Полученный продукт содержит 45% сухих веществ, имеет волокнистое строение, достаточно плотный со слегка коричневатым оттенком, суховат, в холодном состоянии напоминает сильно вываренное мясо, полученное от убоя старого животного.

Пример 2. Продукт волокнистого строения, по консистенции имитирующий говяжье мясо, полученный по схеме примера 1, выдерживают 2 час в дубящей ванне, содержащей 1%-ный раствор алюмокалиевых квасцов, после чего промывают 4%-ным раствором NaCl, пропитывают кукурузным маслом и нагревают. Продукт по консистенции напоминает говяжье мясо, жареное при низкой температуре—120°C долгое время, суховат, при разжевывании крошится, на разрезе сохраняет структуру.

Пример 3. 10 г альгината Na, 100 г казеина, 25 г NaCl растворяют в 855 г 0,05 N раствора NaOH при 40—60°C и при перемешивании в течение 30 мин. Дальнейшую обработку проводят по схеме примера 1, с последующим выдерживанием в дубящей ванне, содержащей 1%-ный раствор алюмокалиевых квасцов в течение 2 час, после чего тщательно

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промывают дистиллированной водой. Полученный продукт напоминает мясо трески, суховат, волокнист.

Пример 4. В растворе, полученном по схеме примера 1, эмульгируют 50 г сливочного маргарина при перемешивании, при 50°C в течение 30 мин. Дальнейшую обработку проводят по примеру 1. Полученный продукт имеет волокнистое строение. По сравнению с примером 1 обладает более нежной консистенцией.

Пример 5. Волокнистый продукт, имитирующий говяжье мясо, получают по схеме, аналогичной примеру 4, но используют коагуляционную ванну, содержащую 10%-ный раствор  $\text{Ca}(\text{CH}_3\text{COO})_2$  и 5%-ный раствор NaCl. Полученный продукт имеет волокнистое строение, выраженное несколько ярче, чем в примере 4, обладает меньшей сочностью и нежностью.

Пример 6. Продукт, полученный по примеру 5, обрабатывают с поверхности копильным препаратом, предлагаемым Институтом народного хозяйства им. Плеханова. Полученный продукт имеет ярко выраженную волокнистую структуру, по внешнему виду и консистенции напоминает варено-копченый шейный зарез.

Пример 7. Продукт волокнистого строения, имитирующий мясоподобный продукт, полученный по схеме примера 1, пропитывают с поверхности расплавленным маргарином 2 час при 50°C. После прогрева продукт сохраняет структуру, обладает несколько большей нежностью, чем продукт примера 1, но малой сочностью.

Пример 8. В коагулят, полученный по схеме примера 1, после промывки его дистиллированной водой добавляют 50 г сливочного маргарина, перемешивают. После этого подвергают экструзии через головку, имеющую 50 отверстий диаметром 5 мм. Полученный экструдит имеет вид волокнистых жгутов (диаметр волокон до 8 мм). Полученный продукт отличается большей пластичностью и нежностью, чем продукт, полученный по схеме 1, имеет привкус и запах маргарина.

Пример 9. 100 г казеина, 10 г альгината Na, 10 г пищевого желатина, 10 г пищевого сывороточного альбумина растворяют в 740 г 0,05 N раствора NaOH при 40—60°C при перемешивании в течение 30 мин. Полученную массу обрабатывают по схеме, аналогичной примеру 1. Готовый продукт имеет хорошо выраженное волокнистое строение, большую водоудерживающую способность и по консистенции и цвету напоминает вареное говяжье мясо. В холодном состоянии продукт значительно жестче, чем в слегка подогретом (до 30—35°C).

Пример 10. 100 г казеина, 5 г гуммиарабика, 10 г пищевого сывороточного альбумина растворяют в 885 г 0,05 N раствора NaOH при перемешивании и нагревании при 40—60°C в течение 30 мин.

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Полученную массу обрабатывают по схеме примера 1. Готовый продукт имеет нежную волокнистую структуру, слегка жесткое, мало сочное.

Пример 11. 100 г казеина, 15 г альгината Na, 10 г гуммиарабика растворяют в 875 г 0,05 N раствора NaOH в течение 30 мин при 40—60°C. Затем в полученном растворе эмульгируют 50 г сливочного маргарина 30 мин при 50°C. Полученную массу обрабатывают по схеме примера 3. Продукт имеет ярко выраженное волокнистое строение, несколько суховат, обладает недостаточной сочностью.

Пример 12. 80 г казеина, 20 г микробного белка, 10 г сывороточного альбумина крови, 10 г альгината натрия, 25 г NaCl растворяют в 845 г 0,05 N раствора NaOH в течение 30 мин при перемешивании, и при 0—60°C. Полученную массу обрабатывают по схеме примера 1. Готовый волокнистый продукт, имитирующий вареное говяжье мясо, по органолептическим свойствам не отличается от продукта, полученного по схеме примера 1.

Пример 13. 80 г казеина, 20 г соевого белка, 10 г альгината Na, 25 г NaCl растворяют в 860 г 0,05 N раствора NaOH в течение 30 мин при перемешивании и при 40—60°C. Полученную массу обрабатывают по схеме примера 3. Готовый продукт волокнист, суховат, обладает малой сочностью и нежностью, напоминает по структурно-механическим свойствам мясо трески.

Пример 14. 100 г казеина, 10 г яичного альбумина, 10 г альгината Na, 25 г NaCl растворяют в 855 г 0,05 N раствора NaOH в течение 30 мин при перемешивании и при 40—60°C. Полученную массу обрабатывают по схеме примера 1. Готовый продукт обладает волокнистой структурой, большей нежностью и сочностью, чем продукт, полученный по примеру 1, и по внешнему виду и структурно-механическим свойствам напоминает куриное мясо.

Пример 15. Аналогично примеру 1 при употреблении исходного раствора, содержащего 10 г альгината Na, 100 г казеина, 10 г сывороточного альбумина крови, 10 г желатина в 870 г 0,05 N NaOH, получают коагулят в ванне, содержащей 10%-ный раствор

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$\text{Ca}(\text{CH}_3\text{COO})_2$ , который отфильтровывают, промывают дистиллированной водой, добавляют 25 г NaCl, 15 г глютамината Na и 15 г гидролизата дрожжей. Затем массу перемешивают и экструдуют. Полученный волокнистый продукт выдерживают 2 час в нагретом до 80—90°C говяжьем жире. Продукт содержит 42—45% белка и 2% жира. При органолептической оценке отмечается темно-красная окраска, подобная окраске соленой говядины, плотная, несколько суховатая волокнистая структура.

Пример 16. Аналогично примеру 15 при эмульгировании в исходном растворе 10% курузного масла получают продукт, содержащий 36—38% белка и 14—16% жира, отличающийся от продукта, описанного в примере 15, несколько более светлой окраской и нежной волокнистой консистенцией.

### Предмет изобретения

1. Способ приготовления продуктов, имитирующих мясopодукты и имеющих волокнистую структуру, путем приготовления студнеобразующих веществ, например, альгината натрия в водном растворе казеина, обработки в солевом растворе для коагуляции, например, в подкисленном растворе солей кальция, отделения коагулята, промывки слабым раствором кислоты, введения ароматизирующих и вкусовых веществ, например липидов, аминокислот, глютамината натрия, нуклеотидов, гомогенизации смеси при нагревании, формирования, обработки связующим веществом, содержащим белки в смеси с различными добавками, и термической обработки, отличающийся тем, что, с целью исключения образования каждого волокна в отдельности и упрощения процесса, массу формируют в подогретом состоянии путем ее растяжения, а после формирования продукт охлаждают.

2. Способ по п. 1, отличающийся тем, что формируемую массу подогревают до 60—80°C.

3. Способ по пп. 1 или 2, отличающийся тем, что растяжение массы ведут с градиентом сдвига в пределах 0,2—2 кг/см<sup>2</sup>.

4. Способ по пп. 1, 2 или 3, отличающийся тем, что продукт охлаждают до 0—20°C.

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Корректор О. Тюрина

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Тираж 456

Подписное

ЦНИИПИ Государственного комитета Совета Министров СССР  
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Москва, Ж-35, Раушская наб., д. 4/5

Типография, пр. Сапунова, 2



Espacenet

**Bibliographic data: GB1310005 (A) — 1973-03-14****METHOD OF PRODUCING PROTEIN-CONTAINING FOOD-STUFFS OF FIBROUS STRUCTURE****Inventor(s):** TOLSTOGUZOV V B; MZHEL'SKY A I; CHEKHOVSKAYA V T; MIKHEEVA N V**Applicant(s):** I ELEMENTOORGANICHESKIKH SOEDI + (ORDENA LENINA INSTITUT ELEMENTOORGANICHESKIKH SOEDINENY)**Classification:** - international: A23J3/28; A23L27/26; A23L29/231; A23L29/256; (IPC1-7): A23J3/00  
- cooperative: A23J3/28; A23J3/285; A23L29/231; A23L29/256**Application number:** GB19710026885 19710419**Priority number (s):** SU19701427324 19700424**Also published as:** BE765673 (A) CA924175 (A) DE2119159 (A1) FR2090572 (A5) NL148788 (B) more**Abstract of GB1310005 (A)**

1310005 Imitation meat ORDENA LENINA INSTITUT ELEMENTO ORGANICHESKIKH SOEDINENY 19 April 1971 [24 April 1970] 26885/71 Heading A2B A protein containing foodstuff having a fibrous structure and resembling a meat product is obtained by forming a gelatinous preparation containing a gelling agent and an edible proteinaceous material, coagulating by heating with a solution of a polyvalent metal salt, separating the coagulate from excess liquid phase, heating, and homogenising the coagulate to form a paste, and subjecting the paste to a suddenly applied load whereby a fibrous structure, having the fibres aligned in the direction of application of the load, is formed therein.

| Electronic Patent Application Fee Transmittal      |                 |                                          |               |                             |
|----------------------------------------------------|-----------------|------------------------------------------|---------------|-----------------------------|
| <b>Application Number:</b>                         |                 | 14796970                                 |               |                             |
| <b>Filing Date:</b>                                |                 | 10-Jul-2015                              |               |                             |
| <b>Title of Invention:</b>                         |                 | METHODS AND COMPOSITIONS FOR CONSUMABLES |               |                             |
| <b>First Named Inventor/Applicant Name:</b>        |                 | Marija Vrljic                            |               |                             |
| <b>Filer:</b>                                      |                 | M. Angela Parsons/Shannon Stadnick       |               |                             |
| <b>Attorney Docket Number:</b>                     |                 | 38767-0010001                            |               |                             |
| Filed as Large Entity                              |                 |                                          |               |                             |
| <b>Filing Fees for Utility under 35 USC 111(a)</b> |                 |                                          |               |                             |
| <b>Description</b>                                 | <b>Fee Code</b> | <b>Quantity</b>                          | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                               |                 |                                          |               |                             |
| <b>Pages:</b>                                      |                 |                                          |               |                             |
| <b>Claims:</b>                                     |                 |                                          |               |                             |
| <b>Miscellaneous-Filing:</b>                       |                 |                                          |               |                             |
| <b>Petition:</b>                                   |                 |                                          |               |                             |
| <b>Patent-Appeals-and-Interference:</b>            |                 |                                          |               |                             |
| <b>Post-Allowance-and-Post-Issuance:</b>           |                 |                                          |               |                             |
| <b>Extension-of-Time:</b>                          |                 |                                          |               |                             |

| Description                             | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
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| Miscellaneous:                          |          |          |        |                      |
| SUBMISSION- INFORMATION DISCLOSURE STMT | 1806     | 1        | 240    | 240                  |
| Total in USD (\$)                       |          |          |        | 240                  |

| Electronic Acknowledgement Receipt          |                                          |
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| <b>EFS ID:</b>                              | 32785228                                 |
| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Shannon Stadnick       |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
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| Document Number                                 | Document Description                               | File Name       | File Size(Bytes)/ Message Digest         | Multi Part /.zip | Pages (if appl.) |
| 1                                               | Information Disclosure Statement (IDS) Form (SB08) | Transmittal.pdf | 72280                                    | no               | 1                |
|                                                 |                                                    |                 | 1b5a2115dac4f19abdcc46bf163144d773563c35 |                  |                  |
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| 3                                               | Foreign Reference                                  | RU2144293C1.pdf | 421913                                   | no               | 7                |
|                                                 |                                                    |                 | 311fc7521cfab11a83977b7c29bd307df2b7bbcc |                  |                  |
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| 4                                               | Foreign Reference                                  | SU301014A1.pdf  | 383573                                   | no               | 4                |
|                                                 |                                                    |                 | 3b4d15197a7c0d0bbf0fe6ea1ed7330383149a48 |                  |                  |
| Warnings:                                       |                                                    |                 |                                          |                  |                  |
| Information:                                    |                                                    |                 |                                          |                  |                  |
| 5                                               | Fee Worksheet (SB06)                               | fee-info.pdf    | 30504                                    | no               | 2                |
|                                                 |                                                    |                 | 1d40bc9a26a7dc3d49940c6eb396c51bae91ca6c |                  |                  |
| Warnings:                                       |                                                    |                 |                                          |                  |                  |
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Attorney Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                        |                                          |             |              |
|------------------------|------------------------------------------|-------------|--------------|
| First Named Inventor : | Marija Vrljic                            | Art Unit :  | 1791         |
| Application No. :      | 14/796,970                               | Examiner :  | Elizabeth A. |
| Filed :                | July 10, 2015                            |             | Gwartney     |
|                        |                                          | Conf. No. : | 8501         |
| Title :                | METHODS AND COMPOSITIONS FOR CONSUMABLES |             |              |

**MAIL STOP ISSUE FEE**

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INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 Form. Foreign patent documents and non-patent literature are enclosed; U.S. patents will be provided upon request.

This statement is being filed after a Notice of Allowance, but before payment of the Issue Fee. A submission fee in the amount of \$240, as required under 37 CFR § 1.17(p), is being paid with this statement.

Each item of information contained in this Information Disclosure Statement was first cited in a Communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. Please apply any other charges, or credits, to Deposit Account No. 06-1050, referencing the above-indicated Attorney Docket Number.

Please contact the undersigned if there are any questions regarding this statement.

Respectfully submitted,

Date: /June 1, 2018/

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| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Shannon Stadnick       |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
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| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 16:41:25                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

| Submitted with Payment | no                                                 |                 |                                                   |                  |                  |
|------------------------|----------------------------------------------------|-----------------|---------------------------------------------------|------------------|------------------|
| <b>File Listing:</b>   |                                                    |                 |                                                   |                  |                  |
| Document Number        | Document Description                               | File Name       | File Size(Bytes)/ Message Digest                  | Multi Part /.zip | Pages (if appl.) |
| 1                      | Information Disclosure Statement (IDS) Form (SB08) | Transmittal.pdf | 72252<br>1e14832e7ce3558adbf6eafd4660f0edefd918c1 | no               | 1                |
| <b>Warnings:</b>       |                                                    |                 |                                                   |                  |                  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |
| This is not an USPTO supplied IDS fillable form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 72252 |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/> <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/> <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/> <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p> |       |



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

|                                   |      |            |
|-----------------------------------|------|------------|
| 26191                             | 7590 | 06/12/2018 |
| FISH & RICHARDSON P.C. (TC)       |      |            |
| PO BOX 1022                       |      |            |
| MINNEAPOLIS, MINNESOTA 55440-1022 |      |            |
| UNITED STATES OF AMERICA          |      |            |

|                       |  |
|-----------------------|--|
| EXAMINER              |  |
| GWARTNEY, ELIZABETH A |  |

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
| 1791     |              |

|                   |               |
|-------------------|---------------|
| NOTIFICATION DATE | DELIVERY MODE |
| 06/12/2018        | ELECTRONIC    |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

|                               |                                         |                                      |                         |
|-------------------------------|-----------------------------------------|--------------------------------------|-------------------------|
| <b>Notice of Allowability</b> | <b>Application No.</b><br>14/796,970    | <b>Applicant(s)</b><br>Vrljic et al. |                         |
|                               | <b>Examiner</b><br>ELIZABETH A GWARTNEY | <b>Art Unit</b><br>1791              | <b>AIA Status</b><br>No |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE filed 17 October 2017; Printer Rush of 4 June 2018.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are See Continuation Sheet. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
**Certified copies:**  
 a) ☐ All      b) ☐ Some      \*c) ☐ None of the:  
     1. ☐ Certified copies of the priority documents have been received.  
     2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

|                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)<br>2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____.<br>3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material _____.<br>4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. | 5. <input type="checkbox"/> Examiner's Amendment/Comment<br>6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance<br>7. <input checked="" type="checkbox"/> Other <u>XRush</u> . |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                         |
|--|---------------------------------------------------------|
|  | /ELIZABETH GWARTNEY/<br>Primary Examiner, Art Unit 1791 |
|--|---------------------------------------------------------|

Continuation Sheet (PTOL-37)

Application No. **14/796,970**

Continuation of 3. The allowed claim(s) is/are: 1-5,7-9,11-12,32-43,45-52 and 56-58

Receipt date: 06/01/2018

Sheet 1 of 1

|                                                                                                                                                                                                                            |                                      |                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------|
| Substitute Disclosure Form<br><br>U.S. Department of Commerce<br>Patent and Trademark Office<br><br><b>Information Disclosure Statement<br/>by Applicant</b><br>(Use several sheets if necessary)<br><br>(37 CFR §1.98(b)) | Attorney Docket No.<br>38767-0010001 | Application No.<br>14/796,970 |
|                                                                                                                                                                                                                            | Applicant<br>Impossible Foods Inc.   |                               |
|                                                                                                                                                                                                                            | Filing Date<br>July 10, 2015         | Group Art Unit<br>1791        |

| U.S. Patent Documents |           |                 |                  |           |       |          |                            |
|-----------------------|-----------|-----------------|------------------|-----------|-------|----------|----------------------------|
| Examiner Initial      | Desig. ID | Document Number | Publication Date | Patentee  | Class | Subclass | Filing Date If Appropriate |
| /E.G./                | 1.        | 4,132,809       | 01/02/1979       | Desrosier |       |          |                            |
| /E.G./                | 2.        | 4,411,915       | 10/25/1983       | Eriksson  |       |          |                            |

| Foreign Patent Documents or Published Foreign Patent Applications |           |                 |                  |                          |       |          |                  |    |
|-------------------------------------------------------------------|-----------|-----------------|------------------|--------------------------|-------|----------|------------------|----|
| Examiner Initial                                                  | Desig. ID | Document Number | Publication Date | Country or Patent Office | Class | Subclass | Translation      |    |
|                                                                   |           |                 |                  |                          |       |          | Yes              | No |
| /E.G./                                                            | 3.        | RU 2144293      | 01/20/2000       | RU                       |       |          | English Abstract |    |
| /E.G./                                                            | 4.        | SU 301014       | 01/15/1974       | USSR                     |       |          | English Abstract |    |

| Other Documents (include Author, Title, Date, and Place of Publication) |           |          |
|-------------------------------------------------------------------------|-----------|----------|
| Examiner Initial                                                        | Desig. ID | Document |
|                                                                         | --        | --       |

|                                                                                                                                                                              |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Examiner Signature<br>/ELIZABETH GWARTNEY/                                                                                                                                   | Date Considered<br>06/06/2018 |
| EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. |                               |

Substitute Disclosure Form

Attorney's Docket No.: 38767-0010001 / M2CON-Track 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                        |                                          |                                         |                       |
|------------------------|------------------------------------------|-----------------------------------------|-----------------------|
| First Named Inventor : | Marija Vrljic                            | Art Unit :                              | 1791                  |
| Application No. :      | 14/796,970                               | Examiner :                              | Elizabeth A. Gwartney |
| Filed :                | July 10, 2015                            | Confirmation No. :                      | 8501                  |
|                        |                                          | Notice of Allowance Date: April 4, 2018 |                       |
| Title :                | METHODS AND COMPOSITIONS FOR CONSUMABLES |                                         |                       |

**MAIL STOP ISSUE FEE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

REPLY TO NOTICE OF ALLOWANCE

In response to the Notice of Allowance dated April 4, 2018, enclosed is a completed Part B - Fee(s) Transmittal.

It is recognized that in accordance with MPEP § 1302.14, the Examiner's reasons for allowance need not set forth all of the details as to why the claims are allowed. In the above-referenced application, it is not conceded that the Examiner's stated reasons for allowance are the only reasons for which the claims are allowable. The Examiner's reasons for allowance indicate that particular claim elements are not disclosed or suggested by the prior art of record, yet the claims may be patentable for other reasons as well, including the inventive combination of all of the recited claim elements. It is not conceded that the specific limitations identified by the Examiner are necessary to distinguish the art of record or to satisfy the requirements of 35 U.S.C. § 112. Moreover, the Examiner does not assert, and it would not be conceded, that the Examiner's reasons have any bearing on the patentability of claims in any other applications directed to the disclosed subject matter.

In addition, each dependent claim stands on its own and may be allowable on its own merits. In particular, each dependent claim may be allowable on the basis of a combination of some of the features recited in the dependent claim and its base claim(s), which combination of features may not include all of the limitations identified in the Examiner's reasons for allowance.

First Named Inventor : Marija Vrljic  
Application No. : 14/796,970  
Filed : July 10, 2015  
Page : 2 of 2

Attorney Docket: 38767-0010001 / M2CON-Track 1

The Issue Fee is being paid with this reply via the Electronic Filing System (EFS).  
Please apply those fees and any other charges, or credits, to Deposit Account No. 06-1050,  
referencing the above-indicated Attorney Docket Number.

Respectfully submitted,

Date: /July 3, 2018/

/M. Angela Parsons/

M. Angela Parsons, Ph.D.  
Reg. No. 44,282

Customer Number 26191  
Fish & Richardson P.C.  
Telephone: (612) 335-5070  
Facsimile: (877) 769-7945

61712884.doc

**PART B - FEE(S) TRANSMITTAL**

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or **Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26191 7590 04/04/2018

FISH & RICHARDSON P.C.  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                    |
|--------------------|
| (Depositor's name) |
| (Signature)        |
| (Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 14/796,970      | 07/10/2015  | Marija Vrljic        | 38767-0010001       | 8501             |

TITLE OF INVENTION: METHODS AND COMPOSITIONS FOR CONSUMABLES

| APPLN. TYPE            | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|------------------------|---------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional         | LARGE         | \$1000        | \$0                 |                      | \$1000           | 07/04/2018 |
| EXAMINER               |               | ART UNIT      | CLASS-SUBCLASS      |                      |                  |            |
| GWARTNEY, ELIZABETH A. |               | 1791          | 426-574000          |                      |                  |            |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 Fish & Richardson P.C.
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2
- 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE  
Impossible Foods Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY)  
Redwood City, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check in the amount of the fee(s) is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 06-1050.

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27.
- ☐ Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.  
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /M. Angela Parsons/

Date /July 3, 2018/

Typed or printed name M. Angela Parsons, Ph.D.

Registration No. 44,282

| Electronic Patent Application Fee Transmittal |          |                                          |        |                      |
|-----------------------------------------------|----------|------------------------------------------|--------|----------------------|
| Application Number:                           |          | 14796970                                 |        |                      |
| Filing Date:                                  |          | 10-Jul-2015                              |        |                      |
| Title of Invention:                           |          | METHODS AND COMPOSITIONS FOR CONSUMABLES |        |                      |
| First Named Inventor/Applicant Name:          |          | Marija Vrljic                            |        |                      |
| Filer:                                        |          | M. Angela Parsons/Judith Witzel          |        |                      |
| Attorney Docket Number:                       |          | 38767-0010001                            |        |                      |
| Filed as Large Entity                         |          |                                          |        |                      |
| Filing Fees for Utility under 35 USC 111(a)   |          |                                          |        |                      |
| Description                                   | Fee Code | Quantity                                 | Amount | Sub-Total in USD(\$) |
| Basic Filing:                                 |          |                                          |        |                      |
| Pages:                                        |          |                                          |        |                      |
| Claims:                                       |          |                                          |        |                      |
| Miscellaneous-Filing:                         |          |                                          |        |                      |
| Petition:                                     |          |                                          |        |                      |
| Patent-Appeals-and-Interference:              |          |                                          |        |                      |
| Post-Allowance-and-Post-Issuance:             |          |                                          |        |                      |
| UTILITY APPL ISSUE FEE                        | 1501     | 1                                        | 1000   | 1000                 |

| Description        | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--------------------|----------|----------|--------|----------------------|
| Extension-of-Time: |          |          |        |                      |
| Miscellaneous:     |          |          |        |                      |
| Total in USD (\$)  |          |          |        | 1000                 |

| Electronic Acknowledgement Receipt          |                                          |
|---------------------------------------------|------------------------------------------|
| <b>EFS ID:</b>                              | 33077384                                 |
| <b>Application Number:</b>                  | 14796970                                 |
| <b>International Application Number:</b>    |                                          |
| <b>Confirmation Number:</b>                 | 8501                                     |
| <b>Title of Invention:</b>                  | METHODS AND COMPOSITIONS FOR CONSUMABLES |
| <b>First Named Inventor/Applicant Name:</b> | Marija Vrljic                            |
| <b>Customer Number:</b>                     | 26191                                    |
| <b>Filer:</b>                               | M. Angela Parsons/Christin Schwartz      |
| <b>Filer Authorized By:</b>                 | M. Angela Parsons                        |
| <b>Attorney Docket Number:</b>              | 38767-0010001                            |
| <b>Receipt Date:</b>                        | 03-JUL-2018                              |
| <b>Filing Date:</b>                         | 10-JUL-2015                              |
| <b>Time Stamp:</b>                          | 11:46:49                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

|                                                                                                                |                             |
|----------------------------------------------------------------------------------------------------------------|-----------------------------|
| Submitted with Payment                                                                                         | yes                         |
| Payment Type                                                                                                   | DA                          |
| Payment was successfully received in RAM                                                                       | \$1000                      |
| RAM confirmation Number                                                                                        | 070318INTEFSW00010217061050 |
| Deposit Account                                                                                                |                             |
| Authorized User                                                                                                |                             |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: |                             |

| <b>File Listing:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         |              |                                          |                  |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|------------------------------------------|------------------|------------------|
| Document Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Document Description                    | File Name    | File Size(Bytes)/<br>Message Digest      | Multi Part /.zip | Pages (if appl.) |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Post Allowance Communication - Incoming | RespNOA.pdf  | 74746                                    | no               | 2                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                         |              | b54ddef1251d1a90b664e0750f1737488ab7b7eb |                  |                  |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |              |                                          |                  |                  |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |              |                                          |                  |                  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Issue Fee Payment (PTO-85B)             | PartB.pdf    | 127145                                   | no               | 1                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                         |              | 19c0f124c5bafee982488b375866725f51791280 |                  |                  |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |              |                                          |                  |                  |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |              |                                          |                  |                  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Fee Worksheet (SB06)                    | fee-info.pdf | 30528                                    | no               | 2                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                         |              | 8ac45e000f913416657e6cd328dd60a56a1daf04 |                  |                  |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         |              |                                          |                  |                  |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |              |                                          |                  |                  |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |              | 232419                                   |                  |                  |
| <p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b><br/>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p> |                                         |              |                                          |                  |                  |



## UNITED STATES PATENT AND TRADEMARK OFFICE

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Address: COMMISSIONER FOR PATENTS  
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| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|------------|------------|---------------------|------------------|
| 14/796,970      | 08/07/2018 | 10039306   | 38767-0010001       | 8501             |

26191 7590 07/18/2018  
FISH & RICHARDSON P.C. (TC)  
PO BOX 1022  
MINNEAPOLIS, MN 55440-1022  
UNITED STATES OF AMERICA

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Marija Vrljic, San Mateo, CA;  
Impossible Foods Inc., Redwood City, CA  
Sergey Solomatin, Mountain View, CA;  
Rachel Fraser, San Francisco, CA;  
Patrick O'Reilly Brown, Stanford, CA;  
Jessica Karr, San Francisco, CA;  
Celeste Holz-Schietinger, East Palo Alto, CA;  
Michael Eisen, Berkeley, CA;  
Ranjani Varadan, Fremont, CA;

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AO 120 (Rev. 08/10)

|                                                                                                                                                                                                        |                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>TO:</b><br><div style="text-align: center;"> <b>Mail Stop 8</b><br/> <b>Director of the U.S. Patent and Trademark Office</b><br/> <b>P.O. Box 1450</b><br/> <b>Alexandria, VA 22313-1450</b> </div> | <b>REPORT ON THE<br/>FILING OR DETERMINATION OF AN<br/>ACTION REGARDING A PATENT OR<br/>TRADEMARK</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been  
filed in the U.S. District Court \_\_\_\_\_ for the District of Delaware \_\_\_\_\_ on the following  
☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

|                                        |                                |                                                     |
|----------------------------------------|--------------------------------|-----------------------------------------------------|
| DOCKET NO.<br>22-cv-00311-CFC          | DATE FILED<br>3/9/2022         | U.S. DISTRICT COURT<br>for the District of Delaware |
| PLAINTIFF<br><br>IMPOSSIBLE FOODS INC. |                                | DEFENDANT<br><br>MOTIF FOODWORKS, INC.              |
| PATENT OR<br>TRADEMARK NO.             | DATE OF PATENT<br>OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK                       |
| 1 10,863,761                           | 12/15/2020                     | IMPOSSIBLE FOODS INC.                               |
| 2                                      |                                |                                                     |
| 3                                      |                                |                                                     |
| 4                                      |                                |                                                     |
| 5                                      |                                |                                                     |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

|                            |                                                                                                                                                                          |                               |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| DATE INCLUDED<br>7/25/2022 | INCLUDED BY<br><input checked="" type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading |                               |
| PATENT OR<br>TRADEMARK NO. | DATE OF PATENT<br>OR TRADEMARK                                                                                                                                           | HOLDER OF PATENT OR TRADEMARK |
| 1 9,943,096                | 4/17/2018                                                                                                                                                                | IMPOSSIBLE FOODS INC.         |
| 2 10,039,306               | 8/7/2018                                                                                                                                                                 | IMPOSSIBLE FOODS INC.         |
| 3 11,013,250               | 5/25/2021                                                                                                                                                                | IMPOSSIBLE FOODS INC.         |
| 4 11,224,241               | 1/18/2022                                                                                                                                                                | IMPOSSIBLE FOODS INC.         |
| 5                          |                                                                                                                                                                          |                               |

In the above—entitled case, the following decision has been rendered or judgement issued:

|                    |                   |      |
|--------------------|-------------------|------|
| DECISION/JUDGEMENT |                   |      |
| CLERK              | (BY) DEPUTY CLERK | DATE |

Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

AO 120 (Rev. 08/10)

|                                                                                                                                               |                                                                                                                         |
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| <b>Mail Stop 8</b><br><b>TO: Director of the U.S. Patent and Trademark Office</b><br><b>P.O. Box 1450</b><br><b>Alexandria, VA 22313-1450</b> | <b>REPORT ON THE</b><br><b>FILING OR DETERMINATION OF AN</b><br><b>ACTION REGARDING A PATENT OR</b><br><b>TRADEMARK</b> |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

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☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

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| 1 10,863,761                           | 12/15/2020                     | IMPOSSIBLE FOODS INC.                               |
| 2                                      |                                |                                                     |
| 3                                      |                                |                                                     |
| 4                                      |                                |                                                     |
| 5                                      |                                |                                                     |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

|                            |                                                                                                                                                                          |                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| DATE INCLUDED              | INCLUDED BY<br><input checked="" type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading |                                                          |
| PATENT OR<br>TRADEMARK NO. | DATE OF PATENT<br>OR TRADEMARK                                                                                                                                           | HOLDER OF PATENT OR TRADEMARK                            |
| 1 9,943,096                | 4/17/2018                                                                                                                                                                | IMPOSSIBLE FOODS INC. (included by amendment on 7/25/22) |
| 2 10,039,306               | 8/7/2018                                                                                                                                                                 | IMPOSSIBLE FOODS INC. (included by amendment on 7/25/22) |
| 3 11,013,250               | 5/25/2021                                                                                                                                                                | IMPOSSIBLE FOODS INC. (included by amendment on 7/25/22) |
| 4 11,224,241               | 1/18/2022                                                                                                                                                                | IMPOSSIBLE FOODS INC. (included by amendment on 7/25/22) |
| 5 See Exhibit A            |                                                                                                                                                                          |                                                          |

In the above—entitled case, the following decision has been rendered or judgement issued:

|                    |                   |      |
|--------------------|-------------------|------|
| DECISION/JUDGEMENT |                   |      |
| CLERK              | (BY) DEPUTY CLERK | DATE |

Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy